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Bibliography on Numerical Forecasting

. 5 June 1954 No. 6

METEOROLOGICAL ABSTRACTS AND BIBLIOGRAPHY

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B. Bibliographic references to other items of interest to the profession.

C. Selective, annotated bibliographies on subjects of immediate and special interest to meteorologists.

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METEOROLOGICAL ABSTRACTS AND BIBLIOGRAPHY

MALCOLM RIGBY, Editor

Vol. 5 JUNE, 1954 No. 6

SPECIAL FEATURE IN THIS ISSUE

A Selective Annotated Bibliography on Numerical Forecasting

(*For complete table of contents see back cover*)

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FOREWORD

Meteorological Abstracts and Bibliography is a monthly publication whose purpose is to ng to the attention of meteorologists current literature in their field and in related fields and provide bibliographic information on various subjects, as interest demands.

Part I contains abstracts of current literature in the fields of meteorology, oceanography, :., arranged according to the Universal Decimal Classification.

Part II of each issue comprises a special annotated bibliography of important references a special subject. No attempt is made to prepare exhaustive bibliographies; instead, the n is to include a representative cross section of the various aspects of a subject.

Bibliographies published in the successive issues of Vol. 1, 1950 were:

Atmospheric Pollution, 2) **Aerobiology,** 3) **Cloud Physics,** 4) **Hail,** 5) **Tornadoes,** 6) **Volcanic ust,** 7) **Climatic Changes,** 8) **Thunderstorms,** 9) **Icing,** 10) **Acoustical Propagation** and 11) **vaporation.**

Those published in Vol. II, 1951 were:

Extended Forecasting, 2) **Long Range Forecasting,** 3) **Soil Temperature,** 4) **Constants, Tables, c.,** 5) **Climate of Near East,** 6) **Climate of Middle East,** 7) **Special Winds,** 8) **Radar Storm etection,** 9) **Condensation Trails,** 10) **Climate of Northeast Africa** and 11) **Mountain Meteorogy.**

Other bibliographies previously published were:

No.	Mo.	Vol. III, 1952	Vol. IV, 1953
1.	Jan.	**Climate—Northwest Africa**	**Turbulence Theory**
2.	Feb.	**Carbon Dioxide**	**Turbulent Diffusion and Exchange**
3.	March	**Climate—Argentina, etc.**	**Frost and Frost Forecasting**
4.	April	**Dew**	**Climate of Australia and New Zealand**
5.	May	**Objective Forecasting**	**High Level Winds (500–100 mb)**
6.	June	**Stratus Forecasting**	**High Level Winds (above 100 mb)**
7.	July	**Urban Climatology**	**Jet Stream**
8.	Aug.	**Climate—Central Africa**	**Radiation Bioclimatology**
9.	Sept.	**Visibility**	**Climatology of the Pacific**
10.	Oct.	**Glaze and Rime**	**Auroras**
11.	Nov.	**Free Air Turbulence**	**Sferics**

Bibliographies published this year are:

1. **General Oceanographic Meteorology,** Vol. V, No. 1, Jan. 1954
2. **Climate of Southeast Asia and Netherlands Indies,** Vol. V, No. 2, Feb. 1954
3. **Physics of Auroras,** Vol. 5, No. 3, March 1954
4. **Tropopause,** Vol. 5, No. 4, April 1954
5. **Balloons,** Vol. 5, No. 5, May 1954
6. **Numerical Forecasting,** Vol. 5, No. 6, June 1954

Forthcoming bibliographies will be:

7. **Radiation Data,** Vol. 5, No. 7, July 1954
8. **Vertical Motion,** Vol. 5, No. 8, Aug. 1954

Other bibliographies in preparation are:

Actinometers
Arctic Meteorology
Climate of the Arctic
Engineering Meteorology
Fog Forecasting
Machine Methods in Meteorology
Microwave Propagation
Night Airglow
Ozone
Singularities
Snow Cover
Synoptic Aerology
Tropical Cyclones
Wind Waves and Currents

Part III contains a listing of the contents of those journals which are primarily meteorogical. These are published in the earliest issue where space permits.

Part IV is made up of author, subject and geographical indexes. In the December issue umulative author, subject, geographical and journal indexes are published.

EXPLANATIONS

Location of material: For each entry, a symbol is given for at least one library where th material may be found. The Union List of Serials (Gregory) is the source of most of th symbols used. In some cases, where no symbol has been assigned to a library, one will h devised according to the principles of the Union List.

Library symbols used frequently may be found in the following list:

DA:	U. S. Dept. of Agriculture Library, Washington, D. C.
DBS:	U. S. Bureau of Standards Library, Washington, D. C.
DGS:	U. S. Geological Survey Library, Washington, D. C.
DLC:	Library of Congress, Washington, D. C.
DN-HO:	U. S. Navy Hydrographic Office Library, Suitland, Md.
DSG:	U. S. Army Medical Library, Washington, D. C.
DSI:	Smithsonian Institution Library, Washington, D. C.
DWB:	U. S. Weather Bureau Library, Washington, D. C.
GB-MO:	Great Britain, Meteorological Office Library, Harrow, England.
MH-BH:	Harvard University, Blue Hill Observatory (and American Meteorologic Society) Library, Milton, Mass.
MCM:	Massachusetts Institute of Technology, Cambridge, Mass.

Other symbols:

*	before an entry indicates a good data source.
†	before an entry indicates a good bibliography.
!	before an entry indicates a synoptic case history study accompanied by chart

Geographic locations are in the English form rather than the form used locally, for exampl Moscow for Moskva.

Titles of articles or monographs are in the language of the original article unless otherwi stated. Slavic (Cyrillic) titles are transliterated into the Roman alphabet according to t Library of Congress transliteration scheme.

Abbreviations:

Titles of periodicals are not abbreviated, as a rule.

The months of the year from March to July are not abbreviated. Other months a abbreviated as Jan., Feb., Aug., Sept., Oct., Nov., and Dec.

The word or abbreviation for Volume (Tom, Band, Jahrgang, Año, etc.), for Numb (Heft, Fascicule, Vypusk, etc.) and for page or pages is omitted from most entries. Thus entry will read as follows:

Meteorologische Rundschau, 2(5/6):146–151, May/June 1950.

This indicates that the article appeared in *Meteorologische Rundschau, Jahrgang* 2 (V 2), *Heft* 5/6 (No. 5/6), *pages* 146–151, May/June 1950.

PART I. ABSTRACTS OF CURRENT METEOROLOGICAL MATERIAL

WORKS OF SPECIAL INTEREST

5.6–1 551.5(058)(43)

Baden. Landeswetterdienst. **Jahresbericht mit Abhandlungen, 1951/1952.** Freiburg, Wetteramt, pref. Oct. 1, 1952. 211 p. illus., tables, refs. Mimeo. **DWB**—The third and last volume in this series. Previous issues were for 1949 and for 1950. Starting with 1953 the weather service in Baden was combined with the German "Bundeswetterdienst." The 1951/52 volume contains a report on activity, list of stations and publications, as well as a review of weather conditions and monthly climatic means for 1951. Twenty papers abstracted separately deal with the climate, phenology and hydrology of Baden, plant climate, cold fronts, soil moisture, weather influences on radioactive radiation, etc. Contents of 1951/52 issue were run in Part III of Aug. 1953, *M.A.B. Subject Headings:* **1. Serials 2. Annual meteorological reports 3. Meteorological services 4. Baden, Germany.**—*A.A.*

5.6–2 551.509.33

§Bliumina, L. I., **Sinopticheskie usloviia ekstremal'no-teplykh i ekstremal'no-kholodnykh sinopticheskikh sezonov vesny na evropeĭskoĭ territorii Soiuza SSR.** [Synoptic conditions during extremely warm and extremely cold synoptic spring seasons in European U.S.S.R.] *Leningrad. Tsentral'nyĭ Institut Prognozov, Trudy,* 11(38):3–29, **1949.** 13 figs., 18 tables. Also: Kist, M. IA., **Sinopticheskie usloviia ekstremal'no-teplykh i ekstremal'no-kholodnykh letnikh sinopticheskikh sezonov na evropeĭskoĭ territorii Soiuza SSR.** [Synoptic conditions of extremely warm and extremely cold synoptic summer seasons in European U.S.S.R.] *Ibid.,* p. 30–85. 24 figs., 16 tables. And: Shishkov, V. G., **Sinopticheskie usloviia ekstremal'no-kholodnykh i ekstremal'no-teplykh sinopticheskikh sezonov oseni na evropeĭskoĭ territorii Soiuza SSR.** [Synoptic conditions of extremely cold and extremely warm synoptic autumn seasons in European U.S.S.R.] *Ibid.,* p. 86–109. 10 figs., 13 tables. And: Tsepkanova, E. I., **Sinopticheskie usloviia ekstremal'no-teplykh i ekstremal'no-kholodnykh sinopticheskikh sezonov zimy na evropeĭskoĭ territorii Soiuza SSR.** [Synoptic conditions of extremely cold and extremely warm synoptic winter seasons in European U.S.S.R.] *Ibid.,* p. 110–134. 12 figs., 15 tables. And: Borisova, E. I., **Sinopticheskie usloviia extremal'no-kholodnykh i extremal'no-teplykh sinopticheskikh sezonov zimy na evropeĭskoĭ territorii Soiuza SSR.** [Synoptic conditions of extremely cold and extremely warm synoptic winter seasons in European U.S.S.R.] *Ibid.,* p. 135–161. 15 figs., 8 tables. **DLC**—These five studies were prepared for improvement of seasonal long range forecasts. Synoptic maps for the period 1891–1947 were used for this investigation as well as climatic data for the same period and also charts of baric topography, especially for the 500 mb level for the period 1938–1948. All seasons, when anomalies of temperature were not less than ±2°C were considered as extremely warm and cold. The studies present an analysis of the synoptic situation which preceded the anomalies and give descriptions of climatic conditions during the period of the anomalies. Many specific situations are shown on maps. Tables of frequency of cases and practical principles for forecasting thermal seasonal anomalies are given in each study. L. I. BLIUMINA established that cold invasions during warm springs are observed over European U.S.S.R. not more than 1 to 3 times per season and usually do not penetrate into the southern regions. But during a cold spring these cold waves return about 4 to 7 times and invade up to 2 to 5 times the southern and southeastern parts of the territory. Surplus amount of precipitation is observed in the western part during warm springs and in the eastern part during cold springs. Deficiency of precipitation is observed during cold springs in the western and during warm springs in the eastern part of European U.S.S.R. The study made by M. IA. KIST classifies peculiarities of synoptic processes preceding the summer, shows that the types of synoptic processes before warm and cold summer anomalies are very different and the

summer temperature regime can be forecast with good results on the basis of observed relation V. G. SHISHKOV finds that extreme cold autumns are influenced by anticyclonic situatio along the Norway axis and well expressed cyclonic activity over the Barents and Kara sea Anticyclonic activity over European U.S.S.R. and cyclones over the region of the Norwegia Sea and Taymur peninsula precede extremely warm autumns. The probability of warm ar cold autumn seasons by various synoptic situations is presented in tables. Forecasts cold and warm autumns can be made on the basis of data obtained during the second pa of the summer. The problem of winter long range forecasting is divided into two part since the investigations made by B. P. MULTANOVSKIĬ, PAGAVA and others indicate that th situation in the first part of winter, the so called pre-winter, varies considerably from th conditions observed in the second part of the winter season. E. I. TSEPKANOVA in her wo for pre-winter and E. I. BORISOVA in her investigation of the winter season have classifi the synoptic situations and present some criteria for long range pre-winter and winter for casting of seasonal anomalies. *Subject Headings:* **1. Long range forecasting 2. Forecastin techniques 3. Synoptic situations 4. Temperature anomalies 5. European U.S.S.** **I. Kist, M. IA. II. Shishkov, V. G. III. Tsepkanova, E. I. IV. Borisova, E. I.**—*N.T.Z.*

5.6–3 551.542.1:551.5

Dedecker, Paul, **L'influence de la force de coriolis sur les mouvements atmosphérique** [The influence of the Coriolis force on atmospheric movements.] *Belgium. Institut Roy Météorologique, Contributions*, No. 6, **1952.** p. 637–640. fig., ref. **DWB.** Reprint fro *Académie Royale des Sciences, des Lettres et des Beaux-arts de Belgique, Brussels, Bulletin de Classe des Sciences*, June 7, **1952.**—The problem is discussed on the basis of the exact equatio of motion, comparing the results with approximate solutions utilized by ROSSBY (*Journ of Marine Research*, 7:175, 1948). The author states that the total resultant of the Corio force applied to an atmospheric vortex is zero, contrary to ROSSBY's results, who, neglecti the vertical component of the Coriolis force, states that the vortex moves toward the po or the equator, depending upon whether the vortex is cyclonic or anticyclonic. *Subj Headings:* **1. Coriolis force 2. Vortex movement. I. Rossby, C.-G.**—*A.A.*

5.6–4 551.583

Geologische Rundschau, Klimaheft. [Climate volume.] *Geologische Rundscha* 34(7/8), Sept. 10, **1944** and 40(1), **1952.** 2 v. illus., bibliogs. V. 1 has added title: **Diluvia Geologie und Klima.** V. 1 edited by Carl Troll; V. 2, edited by Martin Schwarzbach. Engli and French summaries p. 192–200. **DWB**—Disregarding the extreme difficulties during t war, TROLL somehow managed to publish the first climate volume of the *Geologische Rundscha* with almost 800 pages, one of the greatest German contributions to paleoclimatology. T main subjects covered by 14 papers are: the climate of the ice ages, including special studi for the Mediterranean Region, morphological effects of climate, permafrost, structure of soi climatic changes and vegetation, precipitation and ice balance in glacier regions and astr nomical causes of climatic changes. The second volume (200 p.) contains 9 papers on "i dicators" of climate, 3 papers on climate and the distribution of salt and petroleum deposi 8 papers on the history of climates of the earth, one paper on climate and the development species and, finally, 2 papers on the general atmospheric and water circulation. Abstrac for papers of interest to meteorologists will be published separately. *Subject Heading* **1. Paleoclimatology 2. Climatic changes 3. Soil structure 4. General circulation 5. Mec terranean regions. I. Troll, Carl (ed.). II. Schwarzbach, Martin (ed.).**—*A.A.*

5.6–5 532.59:525.

Schönfeld, J. C., **Propagation of tides and similar waves.** 'S-Gravenhage, Staatsdrukker en Uitgeverijbedrijf, **1951.** 232 p. 118 figs., 11 tables, 12 graphs (fold.) in pocket, ref eqs. In English; Dutch and French summaries p. 222–227. **DWB**—Report comprises essentially one dimensional investigation of the propagation of tides in estuaries and, mo generally, of all kinds of hydraulic wave motions of the long wave type, including storm tid in canals and similar conduits. An introduction includes a short survey of the elementa theory and a derivation of the necessary differential equations. Pt. I describes and compar the "harmonic" and "characteristic" conceptions of defining the behavior of long wave motio In Pt. II the accuracy of methods of computing particular wave motions is tested empirical

y performing computations in connection with a controlled laboratory experiment. Efficiency f various methods evaluated. *Subject Headings:* **1. Wave propagation 2. Tides 3. Storm ides.**—*M.P.K.*

5.6–6 551.511(02)

Vialar, J. (*Engr. in Météorologie Nationale*), **Cours de thermodynamique de l'atmosphère. Applications à l'analyse des radiosondages et aux cartes en altitude.** [Course in thermodynamics of the atmosphere. Applications to radiosonde analysis and to altitude charts.] Paris, Météorologie Nationale, March **1950.** 141 p. 6 charts, 58 figs. (3 figs. fold. at end), 4 tables, eqs. **DWB**—A fairly elementary presentation of the principles of thermodynamics of the atmosphere and of the use of adiabatic charts for beginning students in meteorology and for meteorological trainees in the weather service. The individual chapters are as follows: thermodynamic temperatures and the adiabatic chart; analysis of radio soundings; thermodynamic analysis of the stability and instability of air parcels; different processes of air mass development and their results—such as through warming at the base; the use of radio sounding to forecast radiation fog; daily cumulus formation, forecasting of increases, etc.; the use of soundings for air mass analysis and altitude charts including the principles of construction of isobaric surfaces. The various aspects of the meteorological and thermodynamic discussion are illustrated with the aid of adiabatic charts. The mathematical treatment is very elementary and numerical examples are given. *Subject Headings:* **1. Thermodynamics of the atmosphere 2. Air mass analysis 3. Radiosonde data processing 4. Textbooks.**—*I.L.D.*

5.6–7 016:05:5

†**World List of Scientific Periodicals Published in the Years 1900–1950.** 3rd ed. William Allan Smith, Francis Lawrence Kent and George Burder Stratton (*eds.*). New York, Academic Press, Inc., **1952.** 1058 p. Periodic International Congresses, p. 1042–1056. **DLC**—This useful list of about 50,000 scientific serials (natural sciences) published throughout the world from 1900–1950 contains titles of scores of meteorological journals or bulletins, besides the publications in related fields of science, with the accepted British standard abbreviation for each in addition to place of publication and the libraries (247) in the United Kingdom where the publication (or certain volumes of the publication) may be found. The previous edition of the "World List" came out in 1934, so this edition is especially valuable in that it lists all of the new publications started after World War II (including Meteorological Abstracts and Bibliography in 1950). The World List differs essentially from the American "Union List of Serials" in that all entries in the "World List" are strictly by running title, whereas the "Union List" tends to enter titles under the name of the organization if such forms part of the title. Slavic titles are entered in proper alphabetical order (as if transliterated into Roman alphabet) but are printed in the proper Cyrillic form as it appears on the journal. Abbreviations are accepted as standard throughout the British Empire and to some extent in other countries. The présent (third) edition contains twice as many titles as the first which appeared in 1925. *Subject Headings:* **1. Scientific periodicals 2. Bibliographies. I. Smith, William Allan II. Kent, Francis Lawrence III. Stratton, George Burder.**—*M.R.*

GENERAL METEOROLOGY

See also: Baden Landeswetterdienst Yearbook, 5.6–1; **Snow and ice, Monte Fitzroy region, Patagonia** (Lliboutry), 5.6–244.

5.6–8 551.5(04)

Marki, E., **Vrijeme. Praktična uputa u upoznavanje i proricanje vremena bez upotrebe sprava.** [The weather. Practical guide to weather observation and forecasting without instruments.] Split, Yugoslavia, Izdavačko Poduzece Pomorstvo, **1950.** 175 p. 47 figs., refs. **DWB**—Chaps. 1 and 2 of this popular observers guide contain basic information on weather factors and directions for observing them. In Chap. 3 the characteristics of typical weather situations are discussed. In Chap. 4 some 200 "rules of thumb" and popular weather maxims are listed (many of them concerning local winds). In Chap. 5 the author offers some

examples, describing weather developments which actually occurred and referring to the ru in Chap. 4 applicable to them. Photographs (mainly of clouds) are added. *Subject Heading* **1. Popular meteorology 2. Weather lore.**—*G.T.*

5.6–9 551.5(

Current Science and Aviation. Columbus, Ohio, & New York City. Pub. by the Ame can Educational Press. First issue, v. 1, Sept. 1, **1927**; last issue received, v. 39, **1954**. Ti has varied slightly. Weekly during school year. H. B. Goodrich, advisory editor. Pri $1.20 per year. **DLC**—This school paper occasionally includes meteorological articles educational interest, like those in v. 37, No. 30, April 21–25, 1952, on artificial stimulation rain, on weather instruments (elementary description of recording thermometer, baromet wet- and dry-bulb thermometer and anemometer) and on terminology connected with masses and fronts. *Subject Headings:* **1. Periodicals 2. Teaching of meteorology.**—*G.T.*

5.6–10 551.5(

*Split, Yugoslavia. Hidrografski Institut Mornarice. Meteorološki Otsjek, **Vremens Prilike.** [Weather events.] First issue Vol. 1, No. 1, July **1946**; Last issue received Vol. No. 1/2, July **1948**. Monthly through Vol. 2, No. 6, June 1947; quarterly thereafter. Vol. No. 1–6 published under title "Klimatološka Konsultacija." photos, diagrs., tables. Croatian. **DWB**—According to its subtitle this serial is a "popular science letter for mar meteorology." When it was first issued in July 1946 it was merely a folded sheet contain climatological data of the Adriatic region for the period 1933–1940 and the climatic outlo for the month following the date of publication. Starting with the first issue of the sec year of publication the bulletin was not only re-named but extended to include more clima information, like weather types of the Adriatic region, etc. With Vol. 2, No. 7/9, publicat was started on a quarterly basis in bound form. J. E. VAJCL took over the regular feat "Vremenska konsultacija" (Weather advice) giving, as before, the climatic characteristics the coming period on the basis of climatic data for 1933–1940. Climatic data and descripti of weather and circulation for the current year are added as well as educational articles notes on weather observations, instruments and other topics (some of these will be abstract separately). *Subject Headings:* **1. Periodicals 2. Marine meteorology 3. Climatic d 4. Croatian language.**—*G.T.*

5.6–11 551.5(26):551.46:62

Ritchie, G. S. and Deacon, G. E. R., **Navigation and oceanography. A discussi** *Institute of Navigation, London, Journal*, 6(4):380–394, Oct. **1953**. 9 refs. **DWB**—RITC describes early use of meteorological phenomena, currents, etc. in navigation, recent investi tions and possibilities. DEACON discusses effect of wind on tidal streams, wave travel surges. A good discussion follows (p. 388–394). *Subject Headings:* **1. Marine meteorol 2. Marine navigation 3. Oceanography.**—*C.E.P.B.*

5.6–12 551.5:06(9

Simmers, R. G., **Meteorology in New Zealand and the Southwest Pacific, 1948–19** *I.U.G.G. Association of Meteorology, Brussels, 1951, Rapports Nationaux*, p. 7–8, June 19 **DWB**—Short report on routine meteorological activity. *Subject Headings:* **1. Meteorolog services 2. New Zealand.**—*A.A.*

5.6–13 551.5

†Wissmann, Hermann von (*Geogr. Inst. Univ. Tübingen*), **Geography, Part I.** *Fi Review of German Science, 1939–1946*, Vol. 44, **1948**. 22+p. extensive bibliogs. **DL** The first section of this bibliography (Physical Geography, p. 3–135) contains follow reviews (in German): FINSTERWALDER, A., Mapping; FLOHN, H. and BLÜTHGEN, J., Cli tology; GEIGER, R., Microclimatology; GAMS, H., Vegetation and climate of the Quarterna RODEWALDT, E., Medical geography; MACHATSCHEK, F., Geomorphology; STREMME, H. Geography of soils; MACHATSCHEK, F., Glaciology; MACHATSCHEK, F., Potamology, MAULL, O., General and comparative geography. Each article contains brief comments comprehensive works and on papers published in Germany during the period 1939–1 The references are listed alphabetically or in a subject arrangement. *Subject Headi*

Bibliographies 2. German literature 3. Review articles. I. Flohn, H. II. Blüthgen, J. I. Geiger, R. IV. Gams, H. V. Machatschek, F. VI. Stremme, H. E. VII. Rodewaldt, E. III. Maull, O.—*G.T.*

5.6–14 551.5:06(46)

Espagne, rapport de la Section de Météorologie. [Report of the Meteorological Section, Spain.] *I.U.G.G. Association of Meteorology, Brussels, 1951, Rapports Nationaux*, p. 46–47, June 1952. **DWB**—Report on routine meteorological activity. Spain has a network of 11 synoptic observatories, 525 thermo-pluviometric and 2300 pluviometric stations. *Subject Headings:* **1. Meteorological services 2. Spain.**—*A.A.*

5.6–15 551.5:06(04)(469)

Ferreira, Herculano Amorim (*Dir. Portuguese Met. Serv.*), **Divulgação Meteorológico.** [Meteorological news.] *Portugal. Serviço Meteorológico Nacional, RT* 192, MEM 15, Feb. 9, 1952. 23 p. **DWB**—In this series of 21 popular 1-page articles originally written for the *Boletim Meteorológico para a Agricultura* issued quarterly by the Portuguese Meteorological Service (publication of the articles started on Oct. 1, 1951), the author gives a brief and general description of meteorological activities in Portugal, of surface, upper air and maritime observations, of synoptic and forecasting methods, of climatological and meteorological studies, bulletins, journals and other publications, of the application of meteorology to aviation, navigation and military operations and of agricultural, industrial and medical climatology. Some specific information on the Portuguese meteorological network and on meteorological materials is included. *Subject Headings:* **1. Meteorological services 2. Applied meteorology 3. Popular meteorology 4. Portugal.**—*G.T.*

5.6–16 551.5:06(469)

Ferreira, Herculano Amorim (*Dir. Portuguese Met. Serv.*), **Os serviços técnicos do Estado no território nacional.** [Technical services of the state in the national territory.] *Portugal. Serviço Meteorológico Nacional, RT* 96, MEM 12, Nov. 28, 1951. 3 p. **DWB**—In this summary of an address delivered to the 3rd Congress of National Union held at Coimbra in 1951, principles and constitutional foundation of the eleven separate territories of Portugal are referred to and the organization of national services and utilities outlined. The national meteorological and geophysical service is based on a decree issued in Aug. 1946. Home and overseas services are controlled by the ministers of Communications and of Overseas Territories, respectively. Administrative duties and responsibilities of the Nat. Met. Serv. are briefly mentioned. *Subject Headings:* **1. Meteorological services 2. Portugal.**—*G.T.*

5.6–17 551.5:06

Functions of the Weather Bureau. *Pure Oil News*, Chicago, 34(12):7–11, May 1952. Illus. **DWB**—A description of the general service and observational program of the U. S. Weather Bureau, and of the Chicago office in particular. The forecast service and what goes into the making of forecasts, and the importance of the service to business and industry in Chicago are emphasized. Numerous photographs show the various activities at Weather Bureau centers in the Chicago Region. *Subject Headings:* **1. U. S. Weather Bureau Offices 2. Meteorological services 3. Chicago, Ill. I. Dunn, Gordon E.**—*M.R.*

5.6–18 551.5:06

Keränen, J., **Weather conditions and weather service at Helsinki in connection with the Olympic Games.** *Geophysica*, Helsinki, 4(2):79–82, 1953. **DWB**—Report on increased general, aviation and sailing weather service during the games. The weather was unusually chilly. *Subject Headings:* **1. Meteorological services 2. Olympic Games 3. Helsinki, Finland.**—*A.A.*

5.6–19 551.5:06(417)

Meteorological Service [of Ireland]. *I.U.G.G. Association of Meteorology, Brussels, 1951, Rapports Nationaux*, p. 3–7, June 1952. refs. **DWB**—Report on research activities in meteorology, conducted by the meteorological service and the Dublin Institute of Advanced Studies. List of papers added, mostly on statistical, dynamical and agricultural meteorology. *Subject Headings:* **1. Meteorological research 2. Ireland.**—*A.A.*

5.6–20 551.5:06(495

Mariolopoulos, Elias G., **Activité météorologique en Grèce de 1939–1951.** [Meteorc logical activity in Greece, 1939–1951.] *I.U.G.G. Association of Meteorology, Brussels, 1951 Rapports Nationaux*, p. 37–38, June **1952. DWB**—Report on routine meteorological activity Some remarks on scientific research. *Subject Headings:* **1. Meteorological services 2. Greece** —*A.A.*

5.6–21 551.5:06(471.1

National report on meteorological research in Finland 1948–1951. *I.U.G.G. Associatio of Meteorology, Brussels, 1951, Rapports Nationaux*, p. 77–79, June **1952. DWB**—Concis review on meteorological research in Finland. References will be published in *Geophysica Subject Headings:* **1. Meteorological research 2. Finland.**—*A.A.*

5.6–22 551.5:06(464

Le Service Météorologique National et les Services Météorologiques des territoire portugais, 1948–1950. [The National Meteorological Service and the meteorological service of the Portuguese territories, 1948–1950.] *I.U.G.G. Association of Meteorology, Brussels 1951, Rapports Nationaux*, p. 13, June **1952. DWB**—Short report on routine meteorologica activity. *Subject Headings:* **1. Meteorological services 2. Portugal.**—*A.A.*

5.6–23 551.5:0

Sheppard, P. A., **Meteorological conference at Toronto.** *Nature*, London, 172(4391) 1166–1168, Dec. 26, **1953. DWB**—Account of joint meeting of American Meteorologica Society, Royal Meteorological Society and its Canadian branch on Sept. 9–15, 1953. Dis cussions summarized include: ozone and the high atmosphere, radiation problems, Arcti meteorology, general circulation, modern cyclone theory and high level forecasting, climati change, micrometeorology and cloud physics and induced precipitation. Much new materia was described at this highly successful meeting. *Subject Headings:* **1. Meteorological con ferences 2. Toronto, Canada. I. American Meteorological Society II. Royal Meteorologica Society.**—*C.E.P.B.*

5.6–24 551.5:11

Raethjen, Paul, **Zur Morphologie und Dynamik der "lebendigen" Atmosphäre.** [O the morphology and dynamics of the "living" atmosphere.] *Naturwissenschaftliche Rundschau* 6(8):320–326, Aug. **1953.** 7 refs. **DWB**—A philosophical essay on the analogy betwee atmospheric processes and living organisms. This is most clearly seen in L. HOWARD's mor phology of clouds, and is illustrated by cloud photos. Points include: Dual nature of at mosphere, stable or labile, shown by horizontal and vertical clouds; passage of air through cyclone like matter through an organism; thresholds at which sudden changes occur. *Subjec Heading:* **1. Meteorological philosophy.**—*C.E.P.B.*

METEOROLOGICAL OBSERVATIONS AND INSTRUMENTS

METHODS OF OBSERVATION

See also: **Hurricanes Baker and Charlie, Sept. 1952** (Barlow), 5.6–129; **Snow survey measurements, Platte-Arkansas drainage basins** (1936–52), 5.6–229; **Snow survey measurements, Rio Grande drainage basin** (1936–52) (U. S. Soil Conservation Service), 5.6–230.

5.6–25 551.501.1(26

Gaffrey, —, **Wetterbeobachtungsdienst an Bord.** [Weather observation service o ship board.] *Wetterlotse*, No. 54:77–79, March **1953. DLC**—An appeal to ships' officers t make and report their meteorological observations regularly and accurately in spite of diff culties. *Subject Heading:* **1. Marine meteorological observations.**—*C.E.P.B.*

5.6–26 551.501.1

Great Britain. Meteorological Office, **The observer's primer.** 4th ed. London, H. M. Stationery Office, **1950.** 12 p. 2 figs. **GB-MO**—An account in simple language of observations with dry- and wet-maximum and minimum thermometers and raingages, designed for uneducated observers. *Subject Heading:* **1. Observers manuals.**—*C.E.P.B.*

5.6–27 551.501.3:551.524

Caskey, J. E., **Use of the term "Celsius" instead of "Centigrade" and other notes on the International temperature scale of 1948.** *Monthly Weather Review*, 80(12):244–245, Dec. **1952.** table, 13 refs. **MH-BH**—According to an international agreement, the name "Celsius" instead of "centigrade" will be adopted in official publications of the U. S. Weather Bureau after Jan. 1, 1953. Fixed points and other specifications of the International scale are summarized. Zero of Celsius scale 0.0100°C below the triple point of pure water; 273.16°K adopted as the ice point on the Kelvin scale, instead of considered 273.15°K. *Subject Heading:* **1. International temperature scale.**—*A.A.*

5.6–28 551.501.3(02)(72)

Radio Aeronautica de Mejico, **Reporte de Aerovia.** [Airways reporting.] Oct. 1, **1951.** 27 p. 8 tables. **DWB**—Definitions in Spanish of terms used in airways reporting of meteorological phenomena, etc., and specifications for coding various elements and reports. *Subject Headings:* **1. Airways reporting 2. Definitions 3. Observers manuals 4. Mexico. I. Mella P., Leonardo.**—*M.R.*

5.6–29 551.501.4:551.55(26)

Canada. Meteorological Div., **The M.S.C. shipboard wind computer.** *Canada. Meteorological Division, Cir.* 2092, Ins. 32, April 17, **1952.** 5 p. figs. **DWB**—Description of single graphical computer with a transparent scale for the calculation of the true wind speed and direction knowing the apparent wind and the motion of the ship. *Subject Headings:* **1. Wind computation 2. Wind instruments 3. Marine meteorology.**—*A.A.*

5.6–30 551.501.4:551.524

Equivalent temperatures. *Heating and Ventilating*, New York, 50(10): opposite p. 160, Oct. **1953.** graph. **DWB**—A graph for determining still-air equivalent temperature from dry-bulb temperature of the air (t_a) and mean radiant temperature of the surroundings (t_r) is presented. It is based on a formula derived from the index of comfort used in Great Britain and originally developed by DUFTON. The original formula $E.T.=0.522t_a+0.478t_r-0.01474\sqrt{v}(100-t_a)$ is reduced to $E.T.=0.579t_a+0.478t_r-5.72$ for still air conditions (with $v=15$ fpm). *Subject Heading:* **1. Comfort indexes.**—*G.T.*

5.6–31 551.501.4:551.521

Fowles, Grant R., **Tables of thermal radiation and band transmission functions.** Utah. University. Dept. of Physics, Contract AF19(122)-392, Stratospheric radiation, Technical Report, No. 7, Nov. 15, **1952.** 13 p. mostly tables. **DWB**—Table I. Values of $\frac{dB_\nu}{dT}$ [erg cm^{-1} sec^{-1} deg^{-1}], B_ν—black body radiation intensity for unit spectral intervals (from 0 to 2500 cm^{-1} in intervals of 20 units); T—temperature (from 30 to −80°C in intervals of 10°). Table II. Values of transmissivity τ, as a function of Su/d (line intensity times optical thickness to line spacing) and β. Table III. The corresponding slab transmissivity. Table IV. The derivative of this last function. *Subject Headings:* **1. Thermal radiation 2. Band transmission 3. Tables. I. Utah. University. Dept. of Physics II. Contract AF19(122)-392.**—*A.A.*

5.6–32 551.501.42:551.571

Canada. Meteorological Div., **Psychrometric tables.** Toronto, [1953?] 46 p. mostly tables. Price: 50 cents. "These new tables are effective July 1, 1953." **DWB**—The Canadian psychrometric tables are based on the same psychrometric constants as used in the United States in distinction from the British Bilham slide rule. The Goff-Gratch tables of

vapor pressure, as recommended by the W.M.O. have been adopted. For an ice-bulb th constant 3.17×10^{-4} $(°F)^{-1}$ is used. Tables give the adjusted depressions for ventilated an for nonventilated psychrometers dependent on pressure as well as the dew point and relativ humidity itself. A concise explanation of the technical basis and detailed instructions fo practical use are given. *Subject Headings:* **1. Psychrometric tables 2. Canada.**—*A.A.*

5.6–33 551.501.42:551.57

Świokło, Zdzisław, **Diagram psychrometryczny.** [The psychrometric diagram.] *Poland Państwowy Instytut Hydrologiczno-Meteorologiczny, Wiadomości Służby,* 1(5):374–378, **1949** fig., maps (fold.), eqs. **DWB**—Convenient large scale (45×50 cm) psychrometric diagram for water and ice are presented, from which the vapor pressure (mb), the relative humidity and the dew point can be directly determined using the dry bulb temperature and the psy chrometric difference. *Subject Heading:* **1. Psychrometric diagrams.**—*A.A.*

5.6–34 551.501.42:551.57

†*Zimmerman, Oswald Theodore (*Univ. of New Hampshire*) and Lavine, Irvin, **Industria Research Service's psychrometric tables and charts.** Dover, New Hampshire, Industria Research Service, **1945.** 162 p. 32 tables, 22 charts, 22 refs. **DWB**—The theory an application of current knowledge of properties of air-water vapor mixtures at ordinary tem peratures is treated in detail and practical tables and nomograms presented for use in ai conditioning, refrigeration and drying operations in industry. Psychrometric tables presente here are detailed enough for most design problems between −100 and +1000°F. Over score of terms are defined in great detail. Examples are given of use of tables and nomogram in solving specific problems. *Subject Headings:* **1. Psychrometric tables 2. Psychrometri charts 3. Nomograms 4. Definitions. I. Industrial Research Service, Dover, N. H.**—*M.*

5.6–35 551.501.42:551.57

Tunnell, G. A., **Reduction of averages of vapour pressure to sea level.** *Meteorologica Magazine,* London, 82(970):103–113, April **1953.** 5 figs., 2 tables, 16 refs., 15 eqs. **DWB**— Examination of vapor pressures at groups of land stations at various heights gave the formul $e=e_0$ $(1-.00025\ h)$ up to 1300 m. Above that height $e=e_0$ exp. $(-.000295\ h)$ is used. R sults illustrated by station level and reduced maps for Scandinavia. W. Canada is discusse as the special case of a deep inversion requiring different treatment. *Subject Heading* **1. Reduction methods 2. Vapor pressure.**—*C.E.P.B.*

5.6–36 551.501.4

Fabbroni, Evelio O., **Las series cronológicas y su tratamiento metodológico.** [Chron logical series and their methodological treatment.] *Sociedad Científica, Argentina, Buen Aires, Anales,* 154(11):131–136, Nov. **1952.** fig., eqs. **DWB**—A series of observations regarded as made up of sums of secular change, annual and other cycles, and residual com ponents. Author's method of analysis is to eliminate secular and annual changes togethe and regard other cycles as residual. *Subject Headings:* **1. Methods of computation 2. Chron logical series.**—*C.E.P.B.*

5.6–37 551.501.45:517.

Gumbel, E. J., Greenwood, J. Arthur and Durand, David, **The circular normal distribu tion: theory and tables.** *American Statistical Association, Journal,* 48:131–152, March 195 4 figs. 4 tables, 20 refs., eqs. Abstracted from reprint. **DLC**—A method is described f analyzing cycles of known length, such as annual or diurnal, in terms of a circular norm distribution. Equations are given for mean direction and a parameter K is defined by:

$$f(\alpha)=\frac{e^{K\cos(\alpha-\alpha_0)}}{2\pi\ I_0\ (K)}$$

where $I_0\ (K)$ is a Bessel function and α is the phase. Tables are calculated for K and f radii of probability density and area of circular normal distribution in terms of K and *Subject Headings:* **1. Methods of computation 2. Mathematical techniques.**—*C.E.P.B.*

5.6–38 551.501.7:551.510.41:546.214

Kay, R. H. (*Clarendon Laboratory, Oxford*), **An interim report on the measurement of the vertical distribution of atmospheric ozone by a chemical method, to heights of 12 km., from aircraft.** *Great Britain. Meteorological Research Committee, M.R.P.* 817, May 29, **1953.** 5 p. 10 figs., table. Mimeo. **GB-MO**—Measurements of ozone by oxidation of potassium iodide (EHMERT's method) on 13 flights are described. Amounts below 12 km (.001–.002 cm/km) averaged 8% of total O_3. No regular discontinuity was found at tropopause. Results compare well with Umkehr method. *Subject Headings:* **1. Ozone measurement 2. Air sampling and analysis.**—*C.E.P.B.*

5.6–39 551.501.7:551.524

Kliucharev, S. S., **Tekhnika vychisleniia advektivnykh izmenenii temperatury po dannym sharopilotnykh nabliudenii.** [Techniques in measuring the advective temperature change from pilot balloon observations.] *Meteorologiia i Gidrologiia*, No. 4:39–41, Dec. **1951.** 2 figs., table, ref., eq. **DLC**—A practical method of determinating advection is introduced. This method can be used only for the determination of advection in the free atmosphere (above 1 km altitude) and in mountains where local topographic conditions influence the distribution of winds. The formula and nomogram are calculated for latitude 56°. A hodograph for Moscow (June 2, 1947) illustrates the method. *Subject Headings:* **1. Advective temperature change 2. Nomograms 3. Pilot balloon observations.**—*A.M.P.*

5.6–40 551.501.7:551.524.4

Kohl, Gerhard, **Ein Gerät zur Bestimmung des vertikalen Temperaturgradienten aerologischer Aufstiege.** [An instrument determining the vertical temperature gradient of aerological ascents.] *Zeitschrift für Meteorologie*, 7(1):24–27, Jan. **1953.** 4 figs., 4 refs. **MH-BH**—Proposes transparent nomogram with moving ruler suitable for the computation of temperature lapse rate using STÜVE's thermodynamic diagram paper recently revised by HINKELMAN (*see items* 2.1–20 and 2D–29, Jan., April 1951, *MAB*). Theory and construction of the nomograms explained. *Subject Headings:* **1. Aerological nomograms 2. Vertical temperature gradient.**—*A.A.*

5.6–41 551.501.7:551.508.822

Lacaza, Francisco J. A. (*Direccion General de Circulación Aérea y Aerodrómos Argentina*), **Radiosondeo. Importancia y necesidad de las observaciones de altura.** [Radiosounding. Importance and necessity of upper air observations.] *Revista Nacional de Aeronáutica*, Buenos Aires, 12(120):35–36, 72, Dec. **1952.** fig., table. **DWB**—A detailed exposition of the history, operation and usefulness of the radiosonde in studying meteorological and cosmic ray conditions in the atmosphere up to 15 or 20 km. The advantage of the radiosonde over the airplane observation (meteorograph) flight is shown by a table of number and height attained in the 2 kinds of ascents at Oakland (1937) and at Sault Ste. Marie, Michigan (1938), respectively. At Oakland the number of soundings was about the same but the radiosondes attained over 3 times the height of the airplane ascents. At Sault Ste. Marie the height ratio was also 3 to 1 and the radiosondes were successful on 50 to 100% more days than the APOBS. Limitations, types used in various services, and applications to other types of study are mentioned. Jet flights make data from high altitudes imperative. *Subject Headings:* **1. Radiosonde ascents 2. Airplane meteorograph ascents.**—*M.R.*

OBSERVATIONAL DATA

See also: **Water conditions in California** (Calif. Dept. of Public Works), 5.6–237.

5.6–42 551.506:539

Holzman, Ben (*Kirtland Air Force Base, New Mexico*), **Have atom bomb tests fouled up the weather?** *Look*, Des Moines, Iowa, 17(16):32–33, Aug. 11, **1953.** diagr. Biographical note p. 32. **DWB**—The author, who has studied the meteorological effects and attending conditions for a number of atom bomb tests, shows that the atomic debris from the June 4,

1953 test in Nevada was far out to sea in the Atlantic when the Michigan and Worcester, Mass. tornadoes occurred, and states unequivocally that the explosion of an A-bomb does not affect the weather except locally through convective currents attending large scale fires started by the bomb (as at Hiroshima) or by affecting local winds temporarily. The energy and the debris from such an explosion are insignificant compared to the energy of a thunderstorm or hurricane, or condensation nuclei from sea salt or dust which are always present. *Subject Headings:* **1. Atomic explosion effects 2. Tornadoes (June 1953).**—*M.R.*

5.6–43 551.506:06.07(753)

Inaugural day weather. *Science News Letter*, 62(26):402, Dec. 27, **1952. DWB**—Speculating on Washington weather prospects for Jan. 20, this brief note dated Dec. 12 backs meteorologists' opinion that Nov., the month of least precipitation, would be more likely than any other month to assure fair inauguration weather. On reviewing past inauguration days, it was found that the change in 1937 from March 4 to Jan. 20 was a good one, from a meteorological point of view. Weather Bureau long-range forecaster NAMIAS is quoted as refusing commitment beyond Jan. 15, end of his forecast period at that time. Artificial cloud dispersal would be required on a scale too large to be practicable. *Subject Headings:* **1. Inaugural weather 2. Washington, D. C.**—*G.T.*

5.6–44 551.506(046)

Inaugural weather through the years. *Evening Star*, Wash., D. C., Special Rotogravure Section, p. 9, Jan. 20, **1953.** 4 illus. **DWB**—A few instances of bad and fair weather for inauguration day parades or ceremonies are mentioned, their balance being in favor of democratic presidents. Photographs of the parades of 1889, 1893, 1909 and 1929 are presented. Snow marred the celebrations on several instances, the worst being that of President Taft's inauguration March 4, 1909, when a "howling blizzard" prevailed. *Subject Headings:* **1. Inaugural weather 2. Newspaper articles 3. Washington, D. C.**—*G.T.*

5.6–45 551.506.1(497.1)(058)

*Belgrade. Aerološka Opservatorija, **Godišnjak Aerološke Opservatorije u Beogradu 1951. Annuaire de l'Observatoire Aérologique à Belgrade, 1951.** [Yearbook of the Aerological Observatory at Belgrade, 1951.] Belgrade, Yugoslavia, Hidrometeorološka Služba, **1953.** 68 p. 23 figs., numerous tables. In Croatian and French. **DWB**—Data on meteorological and aerological observations for 1951 are arranged in three parts. In Pt. 1, values of wind direction and velocity (determined by means of sounding balloons) at various heights are listed for 6 locations, including Belgrade and Zagreb, where soundings were continuous. Pt. 2 gives the daily weather situation at 19 stations in Yugoslavia (precipitation amount, type of precipitation, and weather type). Pt. 3 contains charts of cold-air invasions and comments by M. CADEŽ. *Subject Headings:* **1. Annual meteorological reports 2. Upper air wind data 3. Precipitation data 4. Yugoslavia.**—*G.T.*

5.6–46 551.506.1(54):551.510.53

***Ionospheric data [for Calcutta and Ahmedabad].** *Journal of Scientific and Industrial Research*, 12A(5):217–219, May **1953.** 5 figs., 2 tables. **DWB**—Starting with this issue the section "Characteristics of the ionosphere over Calcutta" which, in the past, was featured regularly every month, is extended to include data for both Calcutta and Ahmedabad. In all future issues "Ionospheric Data" will appear under this extended form. The data presented in tables and graphs comprise monthly average values of heights and ordinary-ray critical frequencies connected with the E, F_1 and F_2 layers. In addition to the measured values which are published with a two-month lag, the section on Calcutta includes predicted critical frequency values for the month ahead for transmission via the F_2 layer over various distances. *Subject Headings:* **1. Ionospheric data 2. Calcutta, India 3. Ahmedabad, India.**—*G.T.*

5.6–47 551.506.3(418.3)(09)

†Dixon, F. E., **Weather in Old Dublin.** *Dublin Historical Records*, 13:94–107, **1953.** 61 refs. Abstracted from reprint. **GB-MO, CSmH** (Henry Huntington, Lib., San Marino, Calif.)—Well documented survey of weather changes in Ireland especially Dublin since 266 B.C. from annals, newspapers and noninstrumental and instrumental records, under headings

loods, thunder and hail, droughts, frosts, fog, "weather freaks" and fine warm weather. uthor finds no evidence of changes of climate. *Subject Headings:* **1. Historical weather ecords 2. Dublin, Ireland.**—*C.E.P.B.*

5.6–48 551.506.3:551.582(51/2)

*Japan. Central Meteorological Observatory, Tokyo, **Climatic normals and quintile roups of precipitation in the Far East.** [1951?] entirely tables. **DWB**—Monthly normals f air temperature, relative humidity, and precipitation (1901–30) for 52 stations in Japan, orea, the China coast and neighboring island groups are calculated, and quintile limits of recipitation for 39 Japanese stations given *in extenso* for each month for the 1901–30 standard eriod. This is the first case to come to our attention of the printing of this "normal" data hich is used each month in the "CLIMAT" broadcasts and their analyses. *Subject Headings:* **Normal period (1901–1930) 2. Precipitation quintiles 3. CLIMAT data 4. Far East.** —*M.R.*

INSTRUMENT CARRIERS

See also: **Apparatus for cloud chamber investigations with free balloon** (Lofgren, others), 5.6–57; **Atmos. phenomena at high alt.** (Michigan Univ.), 5.6–89; **Rain-trainer,** 5.6–226.

5.6–49 551.507.321.2

Gabites, J. F. and Greig, I. S., **A review of factors affecting the rate of ascent of pilot alloons.** *New Zealand. Meteorological Office, Circular Note*, No. 76, Oct. 17, **1951.** 6 p. refs. **DWB**—Standard rates of ascent of pilot balloons based on empirical formulae used in he United Kingdom and the United States differ by 1 to 8%. Typical variations in the weights f balloons attachments and fillers and in inflation are unlikely to cause deviations from the tandard rates of ascent of more than about 6%. Somewhat greater deviations are likely to rise from irregularities in the shape of individual balloons, turbulent motions of the atmosphere nd neglect of the change of density with height. Inaccuracies in the assumed rate of ascent ill result in proportional inaccuracies in the computed wind speeds and the observations will e attributed to erroneous levels. *Subject Headings:* **1. Pilot balloon ascension rates 2. Pilot alloons.**—*Authors' abstract.*

5.6–50 551.507.362

†Colorado. University. Upper Air Laboratory. Contract W19-122ac-9, **Progress eports, No. 9–13, July 31, Oct. 31, 1950, April 31, July 31 and Jan. 31, 1951.** 5 pieces. hotos, diagrs. refs. **DWB**—In these progress reports the design and operation of a pointing ontrol mechanism for V-2 rockets is described and illustrated with photos and wiring diagrams, tc. The purpose of these mechanisms is to keep the nose of the rocket pointed at the sun s it gyrates on its upward flight. If the nose drifts too far afield an electrical signal is transmitted to an amplifier which drives a servo mechanism that corrects the error. The process perates continuously. Instruments like the solar monochromatic camera, developed by the ame laboratory, must be continuously pointed at the sun with an accuracy of 1 minute of rc. The second attempt at pointing control on a V-2 rocket (launched June 28, 1951) was a ailure as the rocket blew up before the control started to operate. *Subject Headings:* **1. Solar nonochromatic cameras 2. Rocket pointing control mechanism. I. Contract W19-122ac-9.** —*M.R.*

5.6–51 551.507.362

†Newell, Homer E., Jr. and Siry, Joseph W., **Rocket upper air research.** *U. S. Naval Research Laboratory, NRL Reprint*, No. 12–53, **1953.** 10 figs., table, 34 refs. From: *American Rocket Society, New York, Journal*, p. 7–13, Jan./Feb. **1953. DWB**—Review of progress and results of rocket soundings, especially those conducted at White Sands, N. Mex. Various methods of interpreting the available data are discussed. Graphs (reprinted from various papers) showing measured and calculated values of atmospheric pressure, density, temperature, cosmic-ray distribution, ozone concentration, electron density, and intensity of the earth's magnetic field are presented for various altitudes (up to 220 km). A wind of 80 m/sec

was measured at 200 km. The currently accepted value of 0.131 watt/cm² for the sola constant—the authors claim—has been shown by a rocket measurement to be 5% too lo *Subject Headings:* **1. Rocket research 2. Atmospheric structure 3. White Sands, N. Me** —*G. T.*

5.6–52 551.507.362:551.510

Wegener, Kurt, **Die Erforschung der Atmosphäre durch die Rakete.** [Investigatio of the atmosphere by rocket.] *Geofisica Pura e Applicata*, 24:68–70, Jan./April **1953.** 2 ref English summary p. 68. **DLC**—Rocket measurements of temperature cannot be mad accurately by current techniques but must be based on the propagation of sound. The sola constant and spectrum must also be recalculated considering rocket measurements of the ultr short waves which are not all intercepted on a normal surface as are larger solar radiation but are deflected by the earth's magnetic field. *Subject Headings:* **1. Rocket soundin 2. Ionospheric temperature measurement 3. Solar constant corrections 4. Acoustic temperature determination.**—*M.R.*

INSTRUMENTS

See also: **Radiosounding** (Lacaza), 5.6–41; **Atmos. pollution in Pittsburgh** (Ely), 5.6–92; **E–W asymmetry of cosmic rays** (Murty), 5.6–140; **Evapotranspiration measurements, Hong Kong** (Ramage), 5.6–197; **Electronic amplifier for measuring size of precip. particles** (Krasnogorskaia), 5.6–228.

5.6–53 551.508.

Courvoisier, Peter, **Über einen neuen Strahlungsbilanzmesser.** [A new radiation balan meter.] *Schweizerische Naturforschende Gesellschaft, Davos, Verhandlungen*, 130:152–1 **1950.** Abstracted from reprint. **DLC**—A radiation balance meter under construction Davos is presented with improvements which eliminate the influence of wind and of micr climatic temperature variations upon the blackened and exposed measuring surfaces, reduci the time it takes to reach equilibrium and temperature sensitivity and eliminating the need calibration for every reading. The first two experiments are brought about by a spec ventilating method; the time of attaining equilibrium and the temperature sensitivity a reduced by special alloys for the metal measuring plates and all readings are read off direct in cal/min/cm². *Subject Heading:* **1. Radiation balance meters.**—*I.L.D.*

5.6–54 551.508.

Fleischer, Richard, **Strahlungssummenzählung.** [Automatic radiation integratio *Annalen der Meteorologie*, 5(7–12):207–214, **1952.** 4 figs., 4 tables, 5 refs. German a English summaries p. 207. Discussion p. 214. **MH-BH**—A description is given of a syst in use at Fuhlsbüttel Observatory for integrating electrically the direct current from a seleniu element. Daily and hourly results are compared with planimetric measurements of the rad tion and good agreement is obtained. *Subject Heading:* **1. Radiation integrators.**—*C.E.P.B*

5.6–55 551.508.

Eldridge, Ralph G., **Installation and calibration of infrared spectrometer.** Massachuse Institute of Technology. Dept. of Meteorology, Contract AF 19(122)-245, Scientific Repo No. 2, July 1, **1952.** 9 p. 7 figs. **DWB**—Modification of a PERKIN-ELMER infra spectrometer into a double beam system for measurement of transmission in water clouds a a cloud chamber for laboratory testing of the spectrometer are described. *Subject Headin* **1. Infrared spectrometers 2. Light transmission. I. Massachusetts Institute of Technolo Dept. of Meteorology II. Contract AF19(122)-245.**—*Author's abstract.*

5.6–56 551.508.25:551.521

Kudo, Keiei, **Construction of vacuum infrared spectrograph.** *Tokyo. Univ. of Educati Institute for Optical Research, Science of Light*, 1(1):7–10, Jan., **1951.** 5 figs. In Japane English summary appended p. 1. **DWB**—A Wardsworth type infrared spectrograph w installed in a vacuum chamber in order to eliminate the influence of water vapor, carb dioxide and other atmospheric constituents on certain spectral bands. The apparatus described and represented in schematic diagrams. Results obtained in measuring the press

dependence of atmospheric absorption bands are reported and presented in graphs. *Subject Headings:* **1. Infrared spectroscopy 2. Atmospheric absorption 3. Infrared absorption spectrum.**—*G.T.*

5.6–57 551.508.25 551.507.321.2

Lofgren, E. J.; Ney, E. P. and Oppenheimer, F., **Apparatus for cloud chamber investigations with free balloons.** *Review of Scientific Instruments*, 20(1):48–51, Jan. **1949.** 6 figs., 6 refs. **DLC**—Describes the balloons and the six-hour operational instrumentation as used in eight free balloon-flights about 90,000 to 100,000 ft above Camp Ripley, Minn., to take cloud-chamber pictures once per minute by 35 mm. stereo-cameras. Of the six recovered balloons, five yielded about 500 photographs, of which a sample features a nuclear disintegration produced at 83,000 ft by a fast penetrating particle. *Subject Headings:* **1. Cosmic ray instruments 2. Sounding balloons.**—*W.N.*

5.6–58 551.508.25:551.521.64

Marshall, John (*Univ. of Chicago*), **Particle counting by Čerenkov radiation.** *Physical Review*, 86(5):685–693, June 1, **1952.** 7 figs., 5 refs. **DLC**—Description of principles, types and the various uses of the Čerenkov radiation counters as based on experience at the laboratory of the Institute for Nuclear Studies, University of Chicago for counting high energy mesons, electrons and protons. *Subject Headings:* **1. Cosmic ray instruments 2. Particle counters 3. Čerenkov radiation counters.**—*W.N.*

5.6–59 551.508.25:551.521.61

Meier, Rudolf, **Untersuchungen im Gebiet der Zehntelmillimeterwellen.** [Investigations of waves in the tenth-millimeter range.] *Annalen der Physik, 6th Ser.*, 12(1/3):26–34, **1953.** 10 figs., 18 refs. **DLC**—A grating spectrograph is described for measurements of waves between 0.15 and 0.6 mm. Between 0.15 and 0.3 mm an echelette grating gave such high resolving power that the rotation-absorption band of water vapor in room air was partly resolved into lines. *Subject Heading:* **1. Infrared spectroscopy.**—*C.E.P.B.*

5.6–60 551.508.25:551.521.6

Menzies, A. C., **Radiation measuring instruments for the infra-red to ultra-violet waveband.** *Institution of Electrical Engineers, Proceedings*, Pt. III, 99(57):30–31, Jan. **1952.** 2 figs. **DLC**—Short review on recent developments. In the infrared region most work is done on absorption by materials and on gas analyzers, in the visible and ultra-violet regions both emission and absorption spectra were studied. *Subject Headings:* **1. Radiation meters 2. Infrared radiation 3. Ultraviolet spectrum.**—*A.A.*

5.6–61 551.508.25

Momin, A. U. (*Rad. Lab., Met. Office, Poona*), **A new high-speed recording technique for use with infra-red spectroscopes.** *Indian Academy of Sciences, Bangalore, Proceedings, Sec. A*, 37(2):248–253, Feb. **1953.** 5 figs., 2 refs. **DLC**—High speed records on photographic film of the infrared solar spectrum from 0.7–1.2μ, 0.9–4μ, 4–12μ and 2.7–4.3μ show the H_2O, CO_2 and O_3 bands and other prominent features of the spectrum. The technique used by the author at the Radiation Laboratory of the Meteorological Office in Poona, is described. This method can give responses 1000 times as fast as the old Pfund and Firestone radiometers, because the response time of the deflection system is controlled by electronic, rather than mechanical means. Thus the controlling factor is the response of detector, which in this case (Beckman I R-2) has a modulating frequency of 10 c/s, enabling a complete spectrogram to be made in 15 sec instead of 15 min or even hours. *Subject Heading:* **1. Infrared spectrophotometers.**—*M.R.*

5.6–62 551.508.25

Morgen, Alois, **Der Trierer Geländebesonnungsmesser.** [The Treves irradiation measurer.] *Germany. Deutscher Wetterdienst in der US-Zone, Berichte*, No. 42:342–343, **1952.** 3 figs., 4 refs. **DWB**—Describes the construction and use of an instrument for measuring the possible insolation on a slope in latitude 40–60°. *Subject Heading:* **1. Radiation instruments.**—*C.E.P.B.*

5.6–63 551.508.2

Reiffel, Leonard and Burgwald, Glenn, **A wide range radiation instrument.** *Review o Scientific Instruments*, 20(10):711–715, Oct. **1949.** 5 figs., 5 refs. **DLC**—The describe instrument is based on the scintillation counter and has a capability of measuring γ (or β radio activity from one to a hundred milliroentgen/hr. It operates unattended because of no changing scale regardless of varying sources. However, if required to operate over wid temperature ranges it might be necessary to combine a pulse cancellation and thermostati control since experimental test (+40°C to −4°C) showed that 4°C change in temperatur caused a shift of the order of 0.7 μr/hr. *Subject Heading:* **1. Radiation instruments.**—*W.N.*

5.6–64 551.508.25:551.521.6

Watanabe, K. and Inn, Edward C. Y. (*Air Force Cambridge Res. Center*), **Intensit measurements in the vacuum ultraviolet.** *Optical Society of America, Journal*, 43(1):32–3 Jan. **1953.** 4 figs., refs. **DWB**—Intensities of dispersed radiation in the region 500–3000 were measured with a compensated thermocouple mounted at the exit slit of a one-mete normal incidence, vacuum monochromator. With 1-mm slits (17Å band width), He(I) a λ584 was found to be 0.025 microwatt over the exit slit. With a 1P21 tube coated wit sodium salicylate and using 50-micron slits, the relative intensities of the first four member of the principal series of He(I) at λ584, λ537, λ522, and λ516 were measured. The H_2 spectrum from 850 to 3000Å was also obtained with the thermocouple. The relative quantum efficienc of sodium salicylate was found to be constant in this spectral region and about 15 percent lowe at λ584. Some of these measurements were made possible by a great increase of gratin efficiency after an unintentional coating of the grating with a layer of evaporated platinum *Subject Heading:* **1. Ultraviolet recorders.**—*Authors' abstract.*

5.6–65 551.508.25:551.521.6

Wormser, Eric M. (*Servo Corp. of America, New Hyde Park, N. Y.*), **Properties of ther mistor infrared detectors.** *Optical Society of America, Journal*, 43(1):15–21, Jan. **1953** 10 figs., 3 tables. **DWB**—Experimental results are given for quartz- and glass-backe thermistor detectors having sizes of sensitive areas ranging from 0.2 to 12.5 square millimeter Performance criteria for these detectors are tabulated and plotted as a function of size o sensitive area. Typical frequency response and relative spectral responsivity data are give Detector flakes have to be mounted in sealed housings for noise-free operation. Two type of housings are described. *Subject Heading:* **1. Infrared radiation detectors.**—*From author abstract.*

5.6–66 551.508.25:523.7

Yarnell, J. and Goody, R. M. (*Cavendish Lab., Cambridge*), **Infra-red spectroscopy in high-altitude aircraft.** *Journal of Scientific Instruments*, 29(11):352–357, Nov. **1952.** 10 figs 5 refs. **DWB**—An infrared solar spectrometer and a fast electronic heliostat have been de signed to enable solar spectra to be recorded at the base of the stratosphere. The genera characteristics of the apparatus, and some of the major difficulties encountered, are described *Subject Headings:* **1. Infrared spectrometers 2. Solar spectrum.**—*Authors' abstract.*

5.6–67 551.508.2

Agari, S., **A remote reading and recording mercury thermometer with sealed carbo filament.** *Papers in Meteorology and Geophysics*, Tokyo, 2(3–4):334–338, Dec. **1951.** 8 figs **MH-BH**—An extremely simple resistance thermometer is described. In the capillary tub of a mercury thermometer a fine carbon filament with high electric resistance is suspende between two platinum terminals fused in the glass. The accuracy seems to be sufficiently high for meteorological purposes. *Subject Heading:* **1. Thermometers.**—*A.A.*

5.6–68 551.508.26(0

Canada. Meteorological Div., **Liquid in glass thermometers.** *Canada. Meteorologic Div., Cir.* 2163; Ins. 38; Manual 20, Sept. **1952.** 24 p. 8 figs. **DWB**—Manual covers in stallation, care and reading of glass thermometers such as are used in the Canadian Meteoro logical Service for observations of maximum, minimum, grass minimum, earth and bath

(ea) thermometers. The mercury-thallium thermometer, which is often used in Canada at mperatures of −38° to −78°F, is more easily read than the alcohol thermometer which is sually used below −38°F. *Subject Headings:* **1. Thermometers 2. Instrument manuals.** *-M.R.*

5.6–69 551.508.26

Fishwick, W., **Time-lags in thermometer pockets.** *Society of Instrumental Technology, London, Transactions*, 4(1):29–48, **1952.** 12 figs., 10 refs., eqs. Discussion p. 46–48. **DBS**—discussion of errors in protected thermometers due to lag caused by thermal capacities nd thermal resistances of the thermometer system, e.g., mercury in steel thermometers. *Subject Heading:* **1. Thermometer lag.**—*C.E.P.B.*

5.6–70 536(02) 551.508.26(02)

Hall, J. A., **Practical thermometry.** London, Institute of Physics, **1953.** 51 p. 8 figs., tables, 15 refs. **GB-MO**—Rapid survey of different types of instruments: electrical resistance thermometers; thermocouples, including tables of e.m.f. of various couples at −183°C upwards; expansion thermometers of all types including bimetallic; optical and radiation pyrometers. Other chapters deal with calibration and with temperature measurement in practice. *Subject Heading:* **1. Thermometry.**—*C.E.P.B.*

5.6–71 551.541:551.508.43:551.515.8(45)

Mosetti, Ferruccion, **Le onde microbariche.** [Microbaric waves.] *Rivista di Meteorologia Aeronautica*, 12(3):18–35, July/Sept. **1952.** 8 figs., 3 tables, refs. English, French and German summaries p. 18. **MH-BH**—Since winds from different quadrants or of different types (frontal, cyclonic, katabatic, sea breeze, etc.) produce different or characteristic oscillations on a microbarograph trace, these records can be used in synoptic studies or forecasting. The 6 or more ordinary (Alfani) micrograph traces reproduced here show two types of waves: 1) short period (0.5 sec to 5 min) and 2) long-period (5 min to 2 hr). These are analyzed separately to show the air mass or air flow types, which produce records of peculiar form or amplitude. A nomogram is presented to show the maximum amplitude of the microbarogram as a function of the direction and speed of wind. A cyclonic or frontal system will preserve its characteristics with respect to such waves as it progresses from one station to another across the continent. *Subject Headings:* **1. Microbarographs 2. Air flow characteristics 3. Microbaric waves 4. Northwest Italy.**—*M.R.*

5.6–72 551.509.34:551.508.8

Haenni and Co., **La station météorologique suisse.** [The Swiss weather station.] *Les Nouvelles de Haenni*, Jagensdorf, No. 33, March/May **1951.** [7 p.] 5 figs. **DWB**—The Haenni "station" consists of a little house with thermometers, a barometer, and a hygrometer with dials for each instrument and indications as to interpretation in terms of future weather. The article describes each element and gives simple rules for prognostication from the readings, based mainly on wind and pressure changes, with some emphasis on dew point temperatures. *Subject Headings:* **1. Weather guides 2. Amateur forecasting.**—*M.R.*

SYNOPTIC ANALYSIS AND FORECASTING

See also: **Synoptic conditions during extremely warm and cold springs, European U.S.S.R.** (Bliumina, others), 5.6–2; **Swiss weather station** (Haenni & Co.), 5.6–72; **Large scale atmos. vertical motions** (Miller), 5.6–189; **Bibliog. on numerical forecasting,** p. 734–758.

5.6–73 551.509.33:551.590.21:523.74

Baur, Franz, **Die Abhängigkeit des Grosswetters von solaren Erscheinungen.** [The dependence of large-scale weather on solar phenomena.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, 6(2):129–152, Dec. **1953.** 3 figs., 8 tables, 19 refs. German, English and French summaries p. 129–131. **DLC**—Very cold winters in central Europe are much more frequent at or shortly after sunspot maximum and shortly after spot minimum

than at other times. At New Haven, Conn., hot summers occur 3–1½ years before spo extremes. Dry summers in Germany, related to excess pressure over Central Europe, com 2.8–1.9 years before spot extremes. These examples show an undoubted relation of genera weather type to solar processes. In Pt. III multiple correlations are found between severit of winter in Central Europe and sunspot conditions since preceding Feb. In Pt. IV the doub oscillation of general weather type in sunspot cycle is related to variations in the strength the zonal circulation at 500 mb in mid-latitudes, due to persistent changes of solar radiatio especially in U.V. *Subject Headings:* **1. Grosswetter 2. Solar influences.**—*C.E.P.B.*

5.6–74 551.509.33:551.521.1

Brooks, C. E. P., **Forecasting weather from solar radiation.** *Nature*, London, 172(4389) 1089–1090, Dec. 12, **1953.** 2 refs. **DWB**—Review of two papers by C. G. ABBOT (*Smithsonia Miscellaneous Collections*, 122, Nos. 1, 4) and comparison of forecast and observed temperature at Washington, Jan. 1952 to July 1953. *Subject Headings:* **1. Long range forecasting 2. Sola constant. I. Abbot, C. G.**—*C.E.P.B.*

5.6–75 551.509.33:551.577.38(766

Floyd, Ross, **Does 1-wet-2-dry pattern foretell 1953 as another dry year?** *Farme Stockman*, Oklahoma City, 55(12):9, 23, Dec. **1952.** illus., graph. **DWB**—Discussion base on precipitation data for the state of Oklahoma since 1885. Fourteen definitely "wet years were selected. Except for 3 years the critical April–Sept. rainfall was much below normal i both first and second years following these wet years. A few scattered data for previou wet and dry years are summarized for other states in the Midwest, indicating some possibilit for the rule: "When you find one dry year, look for another one nearby." *Subject Heading* **1. Drought 2. Long range forecasting 3. Oklahoma.**—*A.A.*

5.6–76 551.509.33:551.524:551.579

Gay, Robert W. (*U. S. Bureau of Reclamation, Boise*), **Forecasted temperatures and sno melt floods.** *Western Snow Conference, 20th Sacramento, California, April 1952, Proceeding* p. 1–9, **1952.** 6 plates (incl. tables). **DWB**—An attempt to forecast average 5-day maximu temperatures from March 29 to July 1 on the basis of temperatures for various periods befo March 29, using multiple correlation equations not given here. Knowing the march of tem perature the shape of the flood hydrograph can be forecasted, considering the lag betwee snow melt and runoff. Claims to have forecasted an unusual cold spell in 1951 two month in advance. *Subject Headings:* **1. Long range temperature forecasting 2. Snow melt floo 3. Boise River, Idaho.**—*A.A.*

5.6–77 551.509.33:551.590.2

Gillette, Halbert P. (*Water & Sewage Works, San Marino, Calif.*), **Severe winter ahea** *Water and Sewage Works*, San Marino, California, 99(12), Dec. **1952.** port., diagr. Al stracted from reprint. **DLC**—A cold wet winter is forecast for early 1953 due to a conjunctio of Saturn and Neptune on Feb. 18, 1953. The author also discusses historical records floods, tree ring records, etc. which support his theories as to the effect of planets in relatio to sunspots and vice versa. 9.93, 11.2, 12.05, 12.79, 14, 15.23, 15.5, 19.86, 35.5, 96, 672, 201 6048 and 18, 144 year and other cycles are discussed in connection with sunspots, planetar configurations, rainfall, wheat harvests, tree-rings, radio wave emissions from planets an sun, etc. and a new planet predicted from 672 year cycle as found in rainfall or tree-ring *Subject Headings:* **1. Seasonal forecasts 2. Planetary influences 3. Cycles.**—*M.R.*

5.6–78 551.509.3

Jones, Evan, **Wise Mr. Weatherwise.** *American Weekly*, New York, p. 2, Feb. 8, 195 illus. **DWB**—Account of methods and activities of ROBB SAGENDORPH, in charge since 19 of the "Abe Weatherwise" series in the *Old Farmer's Almanac*, which has been giving day-b day weather forecasts for a year ahead since 1792. The predictions are based on lunar cycl and take account of "all available scientific data" and "seemingly irrelevant facts," integrate by a "secret formula" which had been handed down through the generations. A statistic survey for 1947 is claimed to have shown 78.5% accuracy for SAGENDORPH's annual forecas

opposed to 65.5% for the Weather Bureau 5-day bulletin during the same period. *Subject Headings:* **1. Almanacs 2. Forecast accuracy 3. Long range forecasting 4. Sagendorph, Robb 5. Newspaper articles.**—*G.T.*

5.6–79 551.509.33:551.513.3

†*Klein, William H. (*U. S. W. B., Wash., D. C.*), **Some empirical characteristics of long waves on monthly mean charts.** Paper presented at 114th National meeting of the A.M.S., N. Y., Jan. 29, **1952.** 42+p. 13 figs., 7 tables, 46 refs. Photostat of typescript. Also in: *Monthly Weather Review*, 80(11):203–219, Nov. **1952. Appendix to Empirical characteristics . . .** March **1953.** 17 p. figs. 14–19, tables 8–16, 15 refs. Photostat of typescript. **DWB**—Maps for the frequency of ridges and troughs appearing on monthly mean charts of the 700 mb surface are presented (93 cases, partly overlapping, for winter months). Area covered 30–50°N, 160°W–0°. Means and standard deviations of location, wave length, amplitude and geostrophic wind speed given. Interrelationships between these features studied by means of correlation coefficients. A very high correlation ($r=0.93$) was found between simultaneous values of amplitude in N. America and the Pacific. Attempt made to compute average wave motion generally with negative results. Troughs tend to move towards their normal location ($r=0.65$ to 0.79, but not all cases considered). Test on independent dates made. Appendix contains a systematic review of literature and research on long waves, starting with Rossby's work and later modifications and extensions down to Charney's work aimed at numerical forecasting with electronic computers. Empirical work is also reviewed in detail. *Subject Headings:* **1. Long waves in the westerlies 2. Centers of action 3. Long range forecasting 4. North America.**—*A.A., M.R.*

5.6–80 551.509.33:551.509.5(52)

Kubota, K., **Statistical study on long-range forecasting.** *Journal of Meteorological Research*, 3(9):333–335, July **1951.** tables, eqs. In Japanese. **DWB**—Shows method and gives example of verification of long range forecasts for wet and dry seasons, etc. in Japan. *Subject Headings:* **1. Long range forecasting 2. Forecast verification 3. Japan.**—*M.R.*

5.6–81 551.509.33:551.590.23

Nowland, G. W. (*Long Range Weather Forecasting Trust, Sydney*), **Long range weather forecasting.** Sydney, The Land Newspaper, Ltd., [**1950?**] 125 p. tables, diagr. **DLC**—Starting with the theory that planets control the weather on earth through the effect of their magnetic fields on the solar energy received by the earth, the author has made forecasts of droughts, floods, business cycles, etc. up to the year 2000. Elaborate descriptions of conditions in Australia (and to a lesser degree in other places) from 1789 to date and for each month of each year to 1962, are included along with charts showing cycles and their relation to planetary configurations. There is also a table of world droughts dating back to A.D. 484 and of floods to A.D. 80, all tied in with planetary positions. Monthly forecasts are very detailed as to location of rainfall anomalies in the several states of Australia and are based on analogies with other years of the same cyclical type. Considerable attention is given to the Brückner cycle. *Subject Headings:* **1. Long range forecasting 2. Planetary influences 3. Historic droughts 4. Historic floods 5. Australia.**—*M.R.*

5.6–82 551.509.33

Oosawa, Kotiro, **One method of the application of the historical maps to the ten-day weather forecasting.** *Oceanography and Meteorology*, Nagasaki, 5(1/2):41–42, June **1951.** 2 figs. In Japanese. **DWB**—The forecasting method suggested in this paper is based on analogy. A ten-day mean anomaly chart is drawn up for the current year and several similar charts are selected from past years. The forecast is then prepared on the basis of a single chart (the one which is found to show the closest resemblance to the present situation). The application of the method is explained by an example in which 10-day mean anomaly charts of June 6–15, 1951 and June 8–17, 1924 are used. *Subject Headings:* **1. Long range forecasting 2. Forecasting techniques 3. Anomalies.**—*G.T.*

5.6–83 551.509.

Snellman, Leonard W. *(Hqs. Air Weather Service, Wash., D. C.)*, **On changes in the zon wind profile and their relation to forecasting.** *American Meteorological Society, Bulleti* 34(3):91–100, March **1953.** 2 figs., 3 tables. **MH-BH**—Changes in the hemispheric zon wind-profile were used at the USAF South Ruislip Weather Central in England as one for cast tool to help in constructing prognostic charts for 48 hours and occasionally for 96 hou The successes and failures of this technique during the period February to October 1952 a discussed. Suggestions for the improvement of its use on a daily basis are put forth. *Subje Headings:* **1. Extended forecasting 2. Zonal wind profile 3. Forecast aids.**—*Author's abstra*

5.6–84 551.509.

Stagg, J. M., **Review of methods of long-range forecasting with particular reference the British Isles.** *Meteorological Magazine*, London, 82(974):225–232, Aug. **1953. MH-BH** Abridgement of M.R.P. 721 (*see item* 4.6–67, June 1953, *MAB*). *Subject Heading:* **1. Lon range forecasting.**—*C.E.P.B.*

5.6–85 551.509.

van der Bijl, W., **Temperatuurvoorspellingen voor de Afgelopen winter.** [Temperatu forecasts of the past winter.] *Hemel en Dampkring*, 50(10):172–175, **1952. DLC**—A critic examination of the validity of two successful weather forecasts made by F. Baur in No 1951 for the winter 1951–52. The technique of Baur for predicting cold winter on the basis a combination of particular sunspot and atmospheric pressure is outlined. The arbitra choice of conditions and inexact definitions of conditions are pointed out as serious defe of Baur's method. The author shows that Baur's method is not an objective, scienti forecasting technique and is not applicable. *Subject Headings:* **1. Long range forecasti 2. Objective forecasting 3. Baur, F.**—*I.L.D.*

5.6–86 551.509.34(0

†Fisher, Robert Moore, **How to know and predict the weather.** (Original title: **How abo the weather.**) With a foreword by Ernest J. Christie. N. Y., New American Library Mentor Books, **1953.** 186 p. 5 figs., 16 plates, 16 charts, refs. p. 158–161. Price 3. **DWB**—A new edition of a popular, pocket-size book on air masses, fronts, clouds, fog, win rainfall, temperature, air pressure and circulation, structure of the atmosphere, the weath map, and local or amateur forecasting. It is mainly for high school students or adults wishi to make a hobby of observing and predicting the weather. (*See item* 2.9–9, Sept. 1951, *MA* for abstract on original edition which was published by Harper's in 1951.) *Subject Headin* **1. Popular meteorology 2. Amateur forecasting. I. Christie, Ernest J.**—*M.R.*

STRUCTURE AND PHYSICS OF THE ATMOSPHERE

STRUCTURE OF THE ATMOSPHERE—IONOSPHERE

See also: **Measurement of vertical distribution of atmos. ozone by chemical method** (Kay), 5.6–38; **Ionospheric data, Calcutta, Ahmedabad,** 5.6–46; **Investigation of atmos. by rocket** (Wegener), 5.6–52; **A year of high ascents, Berlin** (Scherhag), 5.6–151; **Radio wave scattering and horizontal gradient of ionization in ionosphere** (Banerjee, Banerjee), 5.6–286; **Short wave radio signal scattering, bearing on ionosphere** (Banerjee, others), 5.6–287.

5.6–87 551.51

Porter, Elizabeth M., **Variability of upper air density over Auckland and Nandi.** *N Zealand. Meteorological Office, Technical Note*, No. 96, Feb. 23, **1953.** 2 p. 2 figs., 5 re **DWB**—The standard deviation of density at different levels shows a minimum at 7 gp.k in January and 9 gp.km. in June over Auckland with a well defined level of maximum variabil near 12 gp.km. Over Nandi the standard deviation of density is small, except below 5 gp.k in June, and with that exception varies little with height. *Subject Headings:* **1. Upper density 2. Auckland, New Zealand 3. Nandi, New Zealand.**—*Author's abstract.*

5.6–88 551.510.41:536.7

Goudeket, M., **Isothermen van waterstof en deuterium; tussen 0°C tot drukken van 3000 atmosferen.** [Isotherms of hydrogen and deuterium between 0°C and 150°C with a pressure of 3000 atmospheres.] Assen, Van Gorcum, **1951.** 74 p. diagrs., graphs, tables, refs. English summary p. 72–73. Van Gorcum's Natuurwettenschappelijke Reeks, 12. **DWB**—Result of measurements of hydrogen and deuterium isotherms at 0°, 25°, 50°, 75°, 100°, 125° and 150°C at pressures up to 3000 atmospheres. Laboratory methods are described and illustrated in detail. Of value in determining thermodynamic properties of gases. *Subject Headings:* **1. Hydrogen isotherms 2. Deuterium isotherms 3. Thermodynamics of gases.**—*M.R.*

5.6–89 551.510.41:551.510.53:551.507.362

Michigan. University. Dept. of Aeronautical Engineering, **Atmospheric phenomena at high altitudes.** Contract DA 36-039-sc-125, Progress Report No. 5, Final Report, Sept. 1, **1950** to Dec. 31, **1951.** 43 p. 36 figs., 4 tables, 11 refs. **DWB**—List of a series of reports dealing with activities of project to determine pressure, temperature, density and composition of air at 100 km during aerobee ascents. The report describes methods of obtaining and analyzing samples, shock wave experiments for temperature, a falling sphere experiment for ambient density and temperature. Many photos and graphs show activities and results of project, as well as instrumentation equipment. *Subject Headings:* **1. Atmospheric composition 2. Aerobee observations 3. Stratospheric structure. I. Jones, L. M. II. Contract DA 36-039-sc-125.**—*M.R.*

5.6–90 551.510.41:523.43

Schoenberg, E., **Meteorologie der Mars-Atmosphäre.** [Meteorology of Mars' atmosphere.] *Sternenwelt*, Munich, 3(5/6):82–86, May/June **1951.** 5 figs. **DLC**—Radiometric temperature measurements of the surface of Mars and photographs of the planet served as a basis for these considerations regarding various properties of the Martian atmosphere. Discussed in particular are: 1) chemical composition of the air, 2) the polar caps (identified as condensed water vapor in the air above the poles), 3) the behavior of clouds and fog, 4) horizontal and vertical distribution of atmospheric temperature, pressure and density (with data presented in graphs) and 5) the atmospheric circulation (chart). The description of the probable atmospheric structure of Mars is based on a theory proposed by S. Hess. *Subject Headings:* **1. Mars 2. Planetary atmospheres.**—*G.T.*

5.6–91 551.510.42

Davidson, Ward F. (*Consolidated Edison Co. of N. Y., Inc.*), **Stack meteorology as related to power plants.** *U. S. Technical Conference on Air Pollution, Wash., D. C., 1950, Air Pollution,* **1950.** p. 802–806. fig., 6 refs. **DLC**—Stack meteorology is concerned particularly with the diffusion of dusts and gases (SO_2). Aerodynamic studies indicate that the criterion of stack height above the ground must be supplemented by data on the influence of the building on the flow of air, the effect of "down draft" on the lee side of the power house and the wind direction. The value of an increase of the exit velocity of stack gases so as to compensate for reduction in height of tall stacks, the effect of modification of building shape or proportions on flyash plumes are discussed in terms of experiments carried out in wind tunnels. The proper analysis of meteorological data to aid in the aerodynamic analyses is suggested. *Subject Headings:* **1. Stack meteorology 2. Atmospheric pollution.**—*I.L.D.*

5.6–92 551.510.42:551.508.91

Ely, Sumner B. (*Pittsburgh Bur. of Smoke Prev.*), **Atmospheric pollution in Pittsburgh.** *U. S. Technical Conference on Air Pollution, Wash., D. C., 1950, Air Pollution,* **1950.** p. 431–432. 2 tables. **DLC**—The Pittsburgh air pollution bureau uses an electric air pollution meter, which collects dusts by electric precipitation on a continuously moving tape. Tables showing the monthly average of total dust fall in all cases (tons/sq mi), percent of fixed carbon in deposits and percentage of mineral matter in dust, yearly average, are presented. *Subject Headings:* **1. Atmospheric pollution 2. Atmospheric pollution instruments 3. Pittsburgh, Penna.**—*I.L.D.*

5.6–93 551.510.4

Friedel, R. A. (*U. S. Bureau of Mines, Pittsburgh*), **Spectrometric analyses: applicatio to atmospheric pollutants.** *U. S. Technical Conference on Air Pollution, Wash., D. C., 195 Air Pollution,* **1950.** p. 222–227. 2 figs., 3 tables, 7 refs. **DLC**—A survey of the applicatio of mass and infrared spectroscopy to an analysis of atmospheric pollution with CS_2 extrac of collected samples which consisted of a series of cold traps. Thiophene, o-, m-, and p dichlorobenzene were identified. The infrared and mass spectra of the CS_2 extract are show *Subject Headings:* **1. Atmospheric pollutants 2. Air sampling and analysis 3. Infrare spectroscopy.**—*I.L.D.*

5.6–94 551.510.4

Gurinov, B. P.; Zore, V. A.; Il'ina, A. A. and SHabad, L. M., **O soderzhanii politsikliches kikh aromaticheskikh uglevodorodov v zagriazneniiakh atmosfernogo vozdukha i v dymovyk vybrosakh.** [Content of polycyclic aromatic hydrocarbons in the impurities of air and i smoke pollutants.] *Gigiena i Sanitariia,* Moscow, 2:10–16, Feb. **1953.** fig., 2 tables, re **DLC**—Analysis of 45 samples of soot revealed the presence of carcinogenic substances of th type 3,4 benzpyrene, 1,2,5,6-dibenzanthracene regardless of the type of fuel used. The presence depends upon the manner of burning; more complete burning of the smoke effluen would destroy carcinogenic substances which are organic compounds: 3,4-benzpyrene wa detected in automobile exhausts. Also polluted air was found to contain carcinogenic com pounds but at a much lower concentration. *Subject Headings:* **1. Atmospheric pollutio 2. Carcinogenic substances.**—*I.L.D.*

5.6–95 551.510.42:551.584.3(79

Haagen-Smit, A. J. (*Los Angeles County Air Pollution Control District*), **The air pollutio problem in Los Angeles.** *California Institute of Technology, Engineering and Scien Monthly* [?], 14:1–7, Dec. **1950.** illus. Abstracted from reprint. **DWB** –Air pollutio is a difficult problem in Los Angeles due to a half-circle of mountains, preventing a free mov ment of the air. The diurnal variation of the wind distribution field and frequent temperatu inversions show unfavorable effects. The collection of air contaminants and identification acids and products of incomplete combustion are described, and the effects of smog on plan and rubber summarized. *Subject Headings:* **1. Atmospheric pollution 2. Smog 3. Topo graphic effects 4. Los Angeles, Calif.**—*A.A.*

5.6–96 551.510.4

McCabe, Louis C. and Clayton, George D., **Air pollution by hydrogen sulfide in Poza Ric Mexico: an evaluation of the incident of Nov. 24, 1950.** *Archives of Industrial Hygiene an Occupational Medicine,* Chicago, 6:199–215, Sept. **1952.** 6 figs., 2 tables, refs. Abstracte from reprint. **DWB, DLC**—Catastrophic air pollution incident resulted in 22 deaths and 3 cases of hospitalization. Account of weather conditions is given (low altitude temperatu inversion, little wind movement and pronounced fog). The period of maximum gas co centration was only 20 min. *Subject Headings:* **1. Atmospheric pollution 2. Poza Ric Mexico.**—*A.A.*

5.6–97 551.510.4

*Pittsburgh, Pennsylvania. Bureau of Smoke Prevention, **Report, 1952. 1953.** 17 graphs, tables. **DWB**—The U. S. Weather Bureau takes hourly observations of the clearne of the atmosphere, which are called "Smoke Observations," in a number of large cities. T readings made in downtown Pittsburgh for the past 7 years are tabulated by months for hou of moderate smoke and hours of heavy smoke. There has been a 69.5% decrease in the tot hours of smoke (1005 in 1946 to 284 in 1952) and a 93% decrease in hours of heavy smo (298 hours in 1946 to 21 hours in 1952). Pittsburgh was always known as the Smoky Cit A small electrostatic precipitator has been used since 1951 for recording weight of particula matter collected at 12 stations in Pittsburgh. These results (1951 and part of 1952) a results of dust fall can records (since 1938) are given in tables and graphs. March is t peak month for dust fall collection, due to high winds stirring up dust on ground. *Subj Headings:* **1. Smoke prevention 2. Smoke observations 3. Dust fall data 4. Pittsburg Penna.**—*M.R.*

5.6–98 551.510.42:551.591.33

Ratcliffe, R. A. S., **Difference in visibility between a week-day and Sunday near to an industrial area.** *Meteorological Magazine*, London, 82(978):372, Dec. **1953.** table. **MH-BH**—At Finningley, 5 mi E.S.E. of Doncaster and 20–35 mi from other industrial areas, Sunday has appreciably better visibility than Friday, due to shutting down of most factories at week-end. *Subject Headings:* **1. Smoke haze 2. Visibility variations 3. Weekly weather cycles.**—*C.E.P.B.*

5.6–99 551.510.42:628.53

Regan, C. J., **A Chadwick lecture on air pollution.** *Smokeless Air*, 88:67–73, 76, Winter **1953. DLC**—Report of lecture at Royal Society of Arts, Oct. 15, 1953. Describes the solid matter and injurious gases (chiefly SO_2) emitted into the air in Britain, and their effects (corrosion, damage to health and agriculture, dirt, nuisance and waste of fuel). SO_2, especially in presence of solid particles, attacks metal, stone and fabrics. London fog in Dec. 1952 caused 4000 deaths. Effect of sulphur oxides on lung cancer and of petrol and diesel fumes on lungs is discussed. Remedial measures are considered. *Subject Headings:* **1. Atmospheric pollution.**—*C.E.P.B.*

5.6–100 551.510.42:57

Reifferscheid, Hellmut, **Zum Keimgehalt der Luft.** [On the organic aerosol.] *Annalen der Meteorologie*, 5(7–12):363–367, **1952.** 3 figs., table, 7 refs. **MH-BH**—Organic aerosol is classified into different types, of sizes 10^{-7} cm upwards, and relations to air mass, weather and viable conditions discussed, including effects on epidemics. Measurements on a roof in Darmstadt, Sept. 4–26, 1952, are set out and examined day by day in relation to weather and synoptic situation. *Subject Headings:* **1. Aerobiology 2. Aerosol content of air.**—*C.E.P.B.*

5.6–101 551.510.42:533.15

Shorr, B., **Studies of diffusion in the atmosphere.** General Electric Company, Nucleonics Div., Contract W-31-109-Eng-52, Progress Report, No. 1, March 18, **1952.** 44 p. figs., tables, 6 refs., eqs. On t-p: Experimental Meteorology, Environmental Hazards and General Studies Unit, Biophysics Section, Radiological Sciences Dept., General Electric, Nucleonics Div., Hanford Works. **DWB**—A preliminary report on 9 months of exploratory investigations aimed at the design of future experiments to test the applicability of the theories of diffusion to the dispersion of gases from the Hanford, Wash. atomic works. About 8 out of 20 field tests conducted during the period are discussed and data, photo, etc. presented. Ground (meteorological air sampling, oil generating and emitting devices, etc.) and aerial photographic equipment are also described and illustrated. Tests were conducted under stable and unstable atmospheric conditions. No attempt was made to test or forecast conditions when changes in state with time occur. *Subject Headings:* **1. Atmospheric pollution 2. Dispersion of gases 3. Diffusion equations 4. Hanford, Washington. I. General Electric Co., Nucleonic Div. II. Contract W-31-109-Eng-52 III. Barad, M. L.**—*M.R.*

5.6–102 551.510.42:616

Sroka, Karl H., **Geruch und Gesundheit.** [Odors and health.] *Forschungen und Fortschritte*, 27(2):42–46, Aug. **1953. DLC**—The evil effects of injurious gases and dusts, due to industrial processes, on health are discussed. Counter measures depend on the principle that the indoor air must be as nearly like outdoor air as possible. Methods are: ventilation, preferably by forcing fresh air through the rooms, removal of the worst sources of impurity, and oxidation of the injurious substances by ozone. *Subject Headings:* **1. Odors and health 2. Air conditioning.**—*C.E.P.B.*

5.6–103 551.510.42:612.79

Sulzberger, Marion B. (*N. Y. Univ., Postgraduate Medical School*), **Skin effects of air pollutants.** *U. S. Technical Conference on Air Pollution, Wash., D. C.*, 1950, *Air Pollution*, **1950.** p. 462–467. **DLC**—Lists of various air pollutants which produce systematic poisoning

by way of skin penetration are given and various skin diseases produced by various dusts an particles suspended in the air are described. *Subject Headings:* **1. Air pollutants 2. Ski diseases.**—*I.L.D.*

5.6–104 551.510.4

Troitskiĭ, A. A., **Zamechennye nedostatki rekomendovannykh metodov opredeleniĭ vrednykh veshchestv v vozdukhe.** [Noticeable deficiencies in the recommended method for determining harmful particles in the air.] *Gigiena i Sanitariia*, Moscow, No. 1:58–6(Jan. **1953. DLC**—This note corrects errors in procedure and formulas used in air pollutio studies found in a special circular issued by the Ministry of Health of the RSFSR and in th book by M. V. Alekseev, "Opredelenie vrednykh veshchestv v vozdukhe proizvodstvennyk pomeshcheniĭ" (Determination of harmful substances in the atmosphere in factories). *Subje Heading:* **1. Atmospheric pollution.**—*I.L.D.*

5.6–105 551.510.535:551.594.

Forsyth, P. A.; Currie, B. W. and Vawter, F. E., **Scattering of 56-Mc/s radio waves fro the lower ionosphere.** *Nature*, London, 171(4347):352–353, Feb. 21, **1953.** ref. **DWB**— A persistent scatter echo was recorded at Saskatoon (52.1°N, 106.6°W). It was stronge in March and in the morning hours. Estimated height of scattering region 85 km. *Subje Heading:* **1. Ionospheric reflection.**—*C.E.P.B.*

5.6–106 551.510.535:551.594.

Gibbons, J. J. and Nertney, R. J. (*Penna. St. Col., Ionospheric Res. Lab.*), **Wave solution including coupling, of ionospherically reflected long radio waves for a particular E-regio model.** *Journal of Geophysical Research*, 57(3):323–338, Sept. **1952.** 9 figs., table, 10 refs 10 eqs. **DWB**—This paper extends previous work to the solution of coupled wave equatio arising in ionospheric wave propagation to diurnal and seasonal models of E-region abov Pennsylvania, in which a Chapman E-region has maximum electron density at constant heigh A wave traversing a coupling region below the "reflection" level excites a new wave propagate in the same direction and a reverse back-scattered wave, which appears as a reflected wav In 150 kc/sec waves these effects occur near $N = 300$ e/cm^3. At night the increase in heigh of the bottom of the layer increases the effect and causes stronger split echoes and greate polarization, but the experimental results require also a D-layer. *Subject Headings:* **1. Ion spheric layers 2. Ionospheric reflection.**—*C.E.P.B.*

5.6–107 551.510.535:551.594

Larenz, R. W., **Zur Doppelbrechung der Ionosphäre.** [On double refraction in th ionosphere.] *Naturwissenschaften*, 40(20):527, Oct. **1953.** 5 figs., 3 refs., eq. **DWB**—Th two refraction indexes n of electromagnetic waves for an electron plasma in a magnetic fie are calculated for magnetic field parallel to wave propagation and at an angle with infini and finite conductivity and for different electron pressures. The mathematical difficultie are discussed. *Subject Heading:* **1. Ionospheric refraction.**—*C.E.P.B.*

5.6–108 551.510.535:551.594

*Huxley, L. G. H. (*Adelaide Univ., S. Australia*), **A synopsis of ionospheric cross modul tion.** *U. S. Air Force. Cambridge Research Center, Geophysical Research Papers*, No. 11:13 170, **1952.** figs., tables, 23 refs. **DWB.** Also in: *Nuovo Cimento*, Ser. 9, 9(1), Suppl. p. 59–8 **1952.** 6 figs., 2 tables, 22 refs., 41 eqs. **DLC**—Ionospheric cross modulation (radio wav interaction) observations made at Cambridge and Birmingham show agreement with theor of Martyn and Bailey based on knowledge of chaotic motion of free electrons in gases a electric fields. The theory is developed in detail, the experimental set up described a illustrated, and the seat of cross modulation located at 85 to 90 km, with a scale height about 8.5 km for $\bar{\nu}$ at 90 km. Pressure deduced from these data agree with rocket data f 90 km height. A formula for power supplied per electron from the disturbing wave, generalize to include oblique incidence, gives values to T_0 close to those observed in nature (neglectin influence of earth's magnetic field). *Subject Heading:* **1. Ionospheric cross modulation.**—*M.*

MECHANICS AND THERMODYNAMICS OF THE ATMOSPHERE

See also: **Course in thermodynamics of atmos.** (Vialar), 5.6–6; **Large scale atmos. vertical motions** (Miller), 5.6–189; **Heat balance and ablation of Alpine glaciers** (Hoinkes, Untersteiner), 5.6–195.

5.6–109 551.511:532.5:551.551

†Barrar, Richard B., **Existence and uniqueness theorems relating to the Navier-Stokes equations for incompressible fluids.** Sept. 1952. 36 p. 76 refs., eqs. **DWB**—A valuable literary review made on the basis of 76 papers, published mostly in mathematical journals. Besides the English literature on mathematical problems relating to the Navier-Stokes equations, the author covered also a considerable number of German, French and Russian papers. Some of the items deal with the general and statistical theory of turbulence, shock waves, boundary problems, stochastic processes, harmonic flow analysis, etc. Some of the mathematical pitfalls that must be considered are summarized and a comprehensive catalog of theorems is given (general equations, incompressible non-viscous fluid, Burgen's one dimensional analog, boundary layer equation, non-linear parabolic equations, equations of Oseen, Fokker-Planck and Stokes). *Subject Headings:* **1. Navier-Stokes equations 2. Fluid dynamics 3. Turbulence theory 4. Reviews. I. Contract N5ori-07634.**—*A.A.*

5.6–110 551.511:551.515.31

Gambo, K. and Kasahara, A. (*Geophysical Inst., Tokyo Univ.*), **Notes on the motion of a rotating solid cylinder on a rotating earth.** *Meteorological Society of Japan, Journal,* 30(4):121–125, April 1952. 10 refs., 27 eqs. **MH-BH**—In this thorough mathematical study the author analyzes all forces involved in the rotation of a solid cylinder combined with the earth's rotation. The objective of the study is to establish analogs with the motion of atmospheric vortices. The author finds that his formulas agree in many ways with the expressions derived by SYŌNO in a different approach to the motion of vortices. *Subject Heading:* **1. Vortex dynamics.**—*G.T.*

5.6–111 551.511:551.551

Halstead, M. H., **Experimental verification of the equations for turbulent transfer.** *Johns Hopkins Univ. Laboratory of Climatology, Micrometeorology of the Surface Layer, Interim Report,* 15:31–36, Sept. 1951. fig., table, ref. **DWB**—Verifications of the author's theory (*see item* 4B–259, Feb. 1953, *MAB*) for the calculation of heat flux and shearing stress are given. *Subject Headings:* **1. Turbulence theory 2. Wind structure.**—*A.A.*

5.6–112 551.511:551.513.1:551.55

Hutchings, J. W., **The eddy flux of absolute angular momentum across the equator.** *New Zealand. Meteorological Office, Circular Note,* No. 79, 1951. 2 p. 3 refs. **DWB**—A description is given of a preliminary attempt to measure the eddy transport of absolute angular momentum across the equator during July 1946 by means of atmospheric wind data measured at intervals of approximately 5000 feet from the surface to 50,000 feet. It is concluded that there is little evidence of interhemispherical transport of absolute angular momentum. *Subject Headings:* **1. Angular momentum 2. Eddy transport.**—*Author's abstract.*

5.6–113 551.511:551.551

Krzywoblocki, M. Z. (*Illinois Univ.*), **On the equations of isotropic turbulence in magneto-hydrodynamics of compressible medium.** *Acta Physica Austriaca,* Vienna, 6(2/3):157–166, Nov. 1952. 5 refs., eqs. **DLC**—Generalized fundamental equation developed by the author for the propagation of velocity-, temperature-, pressure- and density correlation functions are applied to a compressible medium subjected to a magnetic field. The dissipation of energy by viscosity and electric conduction is discussed. *Subject Headings:* **1. Turbulence theory 2. Magneto-hydrodynamics.**—*A.A.*

5.6–114 551.511:551.551

†Matchinski, Matthias, **Systèmes de tourbillons sujets à certaines conditions de minima. Application à la formation des rides éoliennes, des dunes, etc.** [Systems of vortexes subject

to certain minimum conditions. Application to the formation of wind ripples, dunes, etc. *Annales de Géophysique*, 8(4):402–442, Oct./Dec. **1952.** 25 figs., 2 tables, 50 refs., eq English summary p. 402. **MH-BH**—The author outlines the mathematical principles unde lying the non-linear equations suitable for expressing the amplitude of wind ripples (such as i clouds and water) and develops equations for vortexes and series of vortexes. Various typ of series of vortexes are analyzed and illustrated. The detailed theoretical results obtaine are applied to various stages of the formation of ripples and dunes and compared with observe facts. *Subject Heading:* **1. Vortexes.**—*G.T.*

5.6–115 551.511:551.556:551.465(261.

Moroshkin, K. V., **O zakonomernostiakh izmeneniia rasseivaniia (dissipatsii) energii statsionarnykh vetrovykh techeniiakh Baltiĭskogo Moria.** [Regularity in changes of energ scattering (dissipation) in stationary wind flows on the Baltic Sea.] *Akademiia Nauk SSS Institut Okeanologii, Trudy*, 5:49–58, **1951.** 3 figs., 2 tables, 4 refs., 7 eqs. **DLC**—Abo 15,000 observations of surface sea currents and winds for period of 1928–1937 were tabulate for regions of 14 floating beacons, located in the Baltic Sea. The computations were mad for wind velocities of 6.5 m/sec, 8.5 m/sec and 11 m/sec. The values of energy scattering a presented in tables for 16 compass points. A special map shows locations of the beacon *Subject Headings:* **1. Energy dispersion 2. Wind driven currents 3. Baltic Sea.**—*N.T.Z.*

5.6–116 551.5

Starr, Victor P. (*Mass. Inst. of Tech.*), **Note on the classic stability problem.** *Tellu* 5(1):105–106, Feb. **1953.** ref. **MH-BH**—A comment arising from criticism of STARR (1950) "Note on recent study of stability by R. Fjortoft" (*see items* 2.8–57 and 5.1–129, Au 1951 and Jan. 1954, *MAB*). The problem of the stability of the vorticity in zonal flow discussed from several angles and a case of an incipient small disturbance in the vorticity fie illustrated. *Subject Headings:* **1. Zonal flow stability 2. Vorticity stability 3. Dynam stability. I. Fjørtoft, R.**—*M.R.*

GENERAL CIRCULATION

See also: **Empirical characteristics of long waves** (Klein), 5.6–79; **Eddy flux of absolute angular momentum across equator** (Hutchings), 5.6–112; **Rainfall in relation to jet streams** (Johnson, Daniels), 5.6–220.

5.6–117 551.513:551.5

Endlich, Roy M., **A study of vertical velocities in the vicinity of jet streams.** *Journ of Meteorology*, 10(6):407–415, Dec. **1953.** 23 figs., 12 refs. **MH-BH**—Vertical velocity was deduced from change of temperature in 3 hours at a point moving with wind on 500 or 3 mb surface, by $W=(\delta T/\delta t)/(\gamma-\gamma d)$. Isanabats were constructed and checked in vario ways including comparison with clouds. Values >10 cm/s (up to 25 cm/s) were foun Cases analyzed include straight W flow and cyclogenesis. The strongest centers of verti velocity were in or near jet stream, rising centers mainly to E of troughs and descendi centers to W, but without particular geometric relation to the jet. Some evidence indicat that the mean circulation around the jet is thermally indirect. *Subject Headings:* **1. J stream 2. Vertical velocities.**—*C.E.P.B.*

5.6–118 551.513:551.5

Ramamurti, K. S., **On fluctuations of the atmospheric circulation in the vicinity of Sou America, and their relation to sunspots.** *Journal of Meteorology*, 10(6):474–477, Dec. 195 fig., 4 tables, 11 refs., 6 eqs. **DWB**—A longitudinal pressure section can be represented $p=\bar{p}+R\sin(K\phi+E)$ and variation $p-\bar{p}$ by $\alpha\cos 6\phi+\beta\sin 6\phi+\gamma\phi\sin 6\phi$. Correlation tween $\bar{p}$, α, β, γ and sunspot numbers are calculated for S. America and indicate that chan of atmospheric circulation consist of fluctuations between low- and high-index which a probably related to sunspots. *Subject Headings:* **1. Atmospheric circulation 2. Sunsp effects 3. South America.**—*C.E.P.B.*

5.6–119 551.513

Rubin, Morton Joseph (*U. S. W. B., Boston*), **Results of recent observational studies of the Southern Hemisphere circulation.** Paper presented during the Symposium on the Use of Models in Geophysical Fluid Dynamics, The Johns Hopkins Univ., Sept. 1–4, **1953.** 11 p. 3 refs., table. Carbon of typescript. [Lacks 5 figs.] **DWB**—General information on some recent studies of the general circulation, including the jet stream, over the oceans surrounding the Antarctic is provided, illustrating basic features by sea level isotherms, 500 mb topography, direction of wind and cloud movements. *Subject Headings:* **1. Atmospheric circulation 2. Jet stream 3. Southern Hemisphere 4. Antarctic Ocean.**—*A.A.*

ATMOSPHERIC DISTURBANCES

See also: **Influence of Coriolis force on atmos. movements** (Dedecker), 5.6–3; **Microbaric waves** (Mosetti), 5.6–71; **Motion of rotating solid cylinder on rotating earth** (Gambo, Kasahara), 5.6–110; **Rainfall over Egypt** (Soliman), 5.6–215; **Periodicity of frontal precip.** (Abdullah), 5.6–218.

5.6–120 551.515

Raethjen, Paul, **Die Bedeutung keilförmiger Einschübe für atmosphärische Druckfeldänderungen.** [The importance of wedge-shaped incursions for changes of the pressure field.] *Annalen der Meteorologie*, 5(7/12):391–394, **1952.** 3 figs., 2 eqs. Discussion p. 394. **MH-BH**—Discusses question: can an approximately barotropic pressure field persist Vorticity and tendency equations must both be satisfied. This can occur in an intrusion at a thin discontinuity through the elimination of vorticity by friction, as observed in the atmosphere. It also occurs in the upper circulation of a frontal cyclone. *Subject Heading:* **1. Stationary perturbations.**—*C.E.P.B.*

5.6–121 551.515(73)

§Smith, Clarence D., Jr. and Roe, Charlotte L. (*U. S. W. B., Wash., D. C.*), **Comparisons between the storms of November 20–22, 1952 and November 25–27, 1950.** *Monthly Weather Review*, 80(11):227–231, Nov. **1952.** 10 figs., table, 8 refs. **MH-BH**—Two cases of destructive storms, moving in the eastern United States northwards to the lower Great Lakes. Storms developed between a high in the middle states and a ridge off the Atlantic coast. Analysis based on surface and 500 mb charts. *Subject Headings:* **1. Storms 2. Synoptic studies 3. Eastern United States.**—*A.A.*

5.6–122 551.515(42):525.63

Steers, J. A., **The East coast floods. January 31–February 1, 1953.** *Geographical Journal*, 119(3):280–298, Sept. **1953.** 7 figs., 10 photos. Discussion p. 295–298. **DLC**—A detailed account is given, with maps, of the genesis and propagation of the high water level from noon Jan. 29 to noon Feb. 1, including synoptic charts at 6 hour intervals of the intense North Sea depression which caused the surge. Predicted high tides, not especially high, were exceeded by 7–9 ft on east coast of England. Flood areas are mapped and damage described, including loss to industry and agriculture. Problems of preventing floods in future, on these coasts sinking by 1–2 mm a year, are discussed. *Subject Headings:* **1. Storm tides 2. England.**—*C.E.P.B.*

5.6–123 551.515(42,493,492):525.63

Szakács, Györgyné, **A januári és februári pusztító szélviharok és áradások.** [The disastrous storms and floods of January and February.] *Természet és Technika*, Budapest, 112(3):185, March **1953.** illus. **DLC**—Description of the cyclonic storms over England, the Netherlands and Belgium on Jan. 24 and 29, 1953, and of the storm tides connected with them. Three photographs of flooded areas are presented. The mechanism of storm tides in general is briefly explained. *Subject Headings:* **1. Storm tides 2. England 3. Belgium 4. Netherlands.**—*G.T.*

5.6–124 551.515.1(99):550.342

Bernard, Pierre, **Recherche de l'origine des microséismes enregistrés à Port-Martin.** [Investigation of the origin of microseisms recorded at Port-Martin.] *Annales de Géophysique*, 9(3):280–283, July/Sept. **1953.** 3 figs., 6 refs. **DWB**—Sketchy comparison of microseismic records (period and amplitude) available for Port-Martin, Adélie Land (July–Sept. 1950), of corresponding synoptic charts (French expedition and U. S. Weather Bureau) and of ocean wave activity. Owing to the paucity of data a correlation between these phenomena can be established only "with a certain degree of probability." Nevertheless the author finds evidence which appears to contradict the opinion held by the British Admiralty that microseisms are caused only by depressions which move at a speed exceeding the group velocity of the ocean waves. *Subject Headings:* **1. Microseisms 2. Cyclonic microseisms 3. Port Martin, Adélie Land.**—*G.T.*

5.6–125 551.515.1(261):550.342

Donn, William L., **Cyclonic microseisms generated in the western North Atlantic Ocean.** *Journal of Meteorology*, 9(1):61–71, Feb. **1952.** 16 figs., 24 refs. **MH-BH**—Microseisms associated with 7 cyclonic storms and one hurricane, from records at 5 points (Bermuda to Halifax, N. S.) are analyzed for amplitude and period. Amplitude depends on wind force, size and distance of generating area, depth of water and bottom. Period (2–7 sec) and regularity vary with depth of water. Origin is attributed to pulsations of air striking the water in cold air turbulence. *Subject Headings:* **1. Microseisms 2. Cyclonic microseisms 3. North Atlantic Ocean.**—*C.E.P.B.*

5.6–126 551.515.1

§Meyer, Hans-Klaus, **Die Bedeutung des Vertikalaustausches für das Bodendruckfeld.** [The importance of vertical exchange for the surface pressure field.] *Annalen der Meteorologie*, 5(7–12):334–345, **1952.** 17 figs., 2 tables. Discussion p. 345. **MH-BH**—An exchange model for a heated surface and cold air bubble above is developed, and compared with depressions: 1) over E. Atlantic, Nov. 4–7, 1951; 2) near Great Lakes April 12–14, 1951; 3) between Ural and Volga Feb. 8–10, 1949. The vertical exchange is evaluated for surface conditions, surface frictional layer, frontal zones and an Atlantic frontal cyclone. It is concluded that heating and vertical exchange are too important to neglect in synoptic development. *Subject Headings:* **1. Cyclone dynamics 2. Cold air bubbles.**—*C.E.P.B.*

5.6–127 551.515.11:551.54

U. S. Bureau of Aeronautics (Navy), **Cyclogenesis.** U. S. Bureau of Aeronautics (Navy) AROWA Project TED-UNL-MA-501, Task 13, Study and Research of Secondary Cyclones, Quarterly Progress Report, (No. 1), July 1–Nov. 30, **1952.** 5 p. **DWB**—Surface cyclogenesis in the Southern European area is investigated and found to be highly dependent on the upper air flow pattern as given by the contours at 500 millibars. Low-level thermal fields are shown to provide a much less important contribution than they do over the United States, especially in the earlier stages. The upper-flow patterns are classified as southwesterly, northwesterly, blocking and westerly. Cyclogenesis following the westerly pattern is catalogued, and a method for prediction, 48 hours in advance, set forth. The composite case is illustrated along with detailed analyses of 16 recent synoptic examples. Data from 51 storms of this type from 1945–1951 are included. *Subject Headings:* **1. Cyclogenesis 2. Upper air flow patterns I. Project AROWA (TED-UNL-MA-501.13).**—*Author's abstract.*

5.6–128 551.515.127:551.57

Sherman, Leon, **Estimates of the vertical velocity based on the vorticity equation.** *Journal of Meteorology*, 10(5):399–400, Oct. **1953.** fig., 3 refs., 4 eqs. **MH-BH**—E. Palmen's 195 explanation of rain area to the E.S.E. of an upper cold low is considered to be in error although it works in practice. An alternative explanation is given, based on vertical component of author's 1952 vorticity equation. *Subject Headings:* **1. Upper level cyclones 2. Precipitation distribution.**—*C.E.P.B.*

5.6–129 551.515.2(261):551.501.81

Barlow, E. W., **Notes on hurricanes Baker and Charlie, western North Atlantic Ocean, September 1952.** *Marine Observer*, 23(162):209–213, Oct. **1953.** 5 figs. **DWB**—Tracks of "Barker," Aug. 31–Sept. 8, 1952 and "Charlie," Sept. 23–30, 1952, are shown and weather reported by ships tabulated. Sketches of radar screen of M. V. "Samanco" given showing remarkable spiral structure. The eye of the storm passed over the ship. *Subject Headings:* **1. Radar storm detection 2. Hurricane "Baker" (1952) 3. Hurricane "Charlie" (1952) 4. North Atlantic Ocean.**—*C.E.P.B.*

5.6–130 551.515.2(729.9)

Behrendt, Ernst, **How the little hurricane knocked out the big hurricane.** *Popular Science Monthly*, New York, 163(3):164–168, 280, Sept. **1953.** diagr. **DWB**—A dramatic popular account of the life history of two hurricanes —"Easy" and "Fix" of 1951, which developed in the same area and followed the same course. "Easy" was an intense storm which might have done tremendous damage to Bermuda had not the second hurricane, "Fix", caught up with it and thrown it off course. Then the two storms proceeded in separate directions and dissipated. How the reconnaissance planes estimate winds from state of sea underneath is described and illustrated. *Subject Headings:* **1. Hurricane reconnaissance 2. Hurricane "Easy" (1951) 3. Hurricane "Fix" (1951) 4. Hurricane conjunction 5. Bermuda.**—*M.R.*

RADIATION AND TEMPERATURE

RADIATION

See also: **Vacuum infrared spectrograph** (Kudo), 5.6–56; **Particle counting by Cerenkov radiation** (Marshall), 5.6–58; **Investigations of waves in the tenth-mm range** (Meier), 5.6–59; **Radiation measuring instruments** (Menzies), 5.6–60; **Intensity measurements in vacuum UV** (Watanabe, Inn), 5.6–64; **Properties of thermistor infrared recorders** (Wormser), 5.6–65; **Forecasting weather from solar radiation** (Brooks), 5.6–74; **Condensation nuclei produced by UV light** (McHenry, Twomey), 5.6–205.

5.6–131 551.521.6:535.7

Pirenne, M. H. (*Aberdeen Univ., Marischal College*), **Limits of the visible spectrum.** *Research*, London, 4(11):508–515, Nov. **1951.** 6 figs., 23 refs. **DLC**—The author deals with the sensitivity of the eye with regard to various kinds of radiation. Approximate spectral distribution of solar energy reaching the earth's surface through a pure atmosphere is indicated and graphically represented. *Subject Headings:* **1. Visible radiation 2. Visual spectral range.**—*G.T.*

5.6–132 551.521.6:541.12

Spode, E. and Weber, E., **Neue Untersuchungen über die reduktionsbeschleunigende Wirkung optischer Strahlung.** [New investigations of the effect of optical radiation in accelerating-reduction.] *Naturwissenschaften*, 40(18):481–482, Sept. **1953.** fig., 4 refs. **DWB**—The acceleration of reduction of albumen and cysteine by light was investigated for different wave-lengths. A sharp peak was found at 313 mμ (Dorno radiation), a secondary peak at 491 mμ. Red and infrared had no effect. *Subject Headings:* **1. Radiation effects 2. Organic chemistry.**—*C.E.P.B.*

5.6–133 551.521.6:523.7

Wild, J. P., **Observations of the spectrum of high-intensity solar radiation at metre wavelengths. IV. Enhanced radiation.** *Australian Journal of Scientific Research, Ser. A, Physical Sciences*, 4(1):36–50, March **1951.** 9 figs., plate, refs. **DLC**—In this final paper of a series, author refers to the theoretical work by other scientists and after briefly summarizing their work, gives a detailed analysis of the high-intensity solar radiation at 70–130 mc/sec. The results indicate that "storm bursts" (i.e., short-lived narrow band bursts) have defined properties and suggest a possible new approach to the theoretical problem of the "enhanced radiation." *Subject Headings:* **1. Solar radiation 2. Solar spectrum 3. Enhanced radiation.**—*W.N.*

5.6–134 551.521.61:551.578.4

*Berger, P., **Estimation of net longwave radiation from snow.** *U. S. Corps of Engineers Snow Investigations, Research Note*, Oct. 10, **1952.** 26 p. 4 tables, 2 figs., 4 refs., eqs. **DWB**—Observations of incident (all-wave) and net irradiation of short wave incident and reflecte radiation made from Oct. 27 to Nov. 30, 1951, at the Central Sierra Snow Laboratory wer analyzed and computed, and comparison made with calculations from an adapted Brunt for mula. Air and snow surface temperatures, dew point, cloud height and sky cover data wer used to calculate net long wave radiation. Two Gier-Dunkle radiometers were used for al wave incident and net radiation, and shortwave records were obtained from Eppley pyrhel ometers located within 50 ft of the other radiometers. Since first attempts at computatio gave unsatisfactory results, a second general equation was tried. This gave better results, bu when simplified to $C_7+C_8W=R_{net}+.00363t_s+.344$ accounted for only 24% of variation i net longwave radiation in all weather compared to 62% for the general equation. Reliabilit of daytime data is questionable. Average net longwave radiation on clear night was 0.1 ly/min. Heat loss from pack during 24 hour period was 127 ly in clear weather and 105 l cloudy weather. All data, both detailed observations and computations therefrom, an regression curves for several attempts, are included in this report which supplements the Fe 28, 1952, report entitled "Trial estimates of net longwave radiation from snowpacks." *Subje Headings:* **1. Radiation from snow cover 2. Central Sierra Snow Laboratory, California.**—*M.*

5.6–135 551.521.61:523.77:535.

Gauzit, Junior, **Identification probable des raies interdites infrarouges de l'atome neut d'azote dans le spectre du soleil.** [Probable identification of forbidden infrared lines of t neutral nitrogen atom in the solar spectrum.] *Académie des Sciences, Paris, Comptes Rendu* 234(22):2156–2157, May 26, **1952.** 6 refs. **DWB**—An examination of forbidden lines N(I) in the infrared solar spectrum (10,395–406Å) reveals that they are present in great intensity than lines of OI. *Subject Headings:* **1. Forbidden nitrogen lines 2. Solar spectru 3. Infrared spectroscopy.**—*M.R.*

5.6–136 551.521.63:523.7

Das, A. K. and Ramanathan, A. S., **Distribution of radiation flux across a sunspo** *Zeitschrift für Astrophysik*, 32(2):91–103, **1953.** 15 figs., 14 refs., eq. **DWB**—Technique spectrograph studies of a large spot Jan. 11–14, 1952, at Kodaikanal described. Profiles ratio of radiation spot/photosphere in continuous spectrum give values from 0.34 at 3842 0.38 at 4043Å. Intensity variation of absorption curves at several wave lengths show t decrease of contrast between spot and background with increase of height above photosphe The bright ring around the penumbra was 2–3% brighter than background, decreasing wi height. Secchi's ring around umbra was found with varying brightness. *Subject Heading* **1. Ultraviolet radiation 2. Sunspots.**—*C.E.P.B.*

5.6–137 551.521.

Caldirola, P.; Fieschi, R. and Gulmanelli, P., **A phenomenological theory of cosm radiation in the atmosphere.** *Il Nuovo Cimento*, 9th Ser., 9(1):5–35, Jan. **1952.** 14 fig 60 refs., eqs. **DLC**—The experimental results on the composition of cosmic radiation at t top of the atmosphere are used to develop a phenomenological theory of all processes whi occur in the cosmic radiation while it traverses the atmosphere. We have computed t distribution of the fast nucleonic component (protonic and neutronic), the distribution of t mesonic component and its energy spectrum and positive excess at various altitudes, and t distribution of the electronic component. The latitude effects due to the earth's magne field are studied accurately. The theoretical results obtained are discussed, in the light the most recent experimental data. *Subject Heading:* **1. Cosmic radiation.**—*Authors' abstra*

5.6–138 551.521.64:537.59

Caro, D. E.; Parry, J. K. and Rathgeber, H. D., **The momentum spectrum and positi excess of cosmic ray mesons at sea-level.** *Australian Journal of Scientific Research, Ser. Physical Sciences*, 4(1):16–35, March **1951.** 11 figs., plate, 2 tables, 24 refs., 4 eqs. **DLC** Using a spectrometer the momentum spectrum of charged mesons is measured and record

y a magnetic deflection method. The results are discussed, and agreement with cloud amber and absorption methods is found over the range 2.4×10^8 eV./c to 10^{10} eV./c. Above ^{10} eV./c the spectrum falls off faster than experiments suggested. *Subject Headings:* **1. Cosmic y mesons 2. Momentum spectrum 3. Spectrometers.**—*W.N.*

5.6–139 551.521.64:551.543

Citron, Anselm, **Der Barometereffekt grosser Luftschauer.** [The barometric effect of urge cosmic showers.] *Zeitschrift für Naturforschung*, 7a(11):712–721, Nov. **1952.** 5 figs., tables, 32 refs. **DLC**—Several observers have found that the frequency of large cosmic showers decreased with increasing barometric pressure, by around 10%/cm Hg. This was investigated with a row of 5 counters at Freiburg and nearby mountain station (1250 m), for heavy and light showers (mean density ratio 6.5:1). The mean effect was 7–9% in winter greatest for heavy showers) and 12% in summer. The causes of these differences are discussed. *Subject Heading:* **1. Cosmic ray showers.**—*C.E.P.B.*

5.6–140 551.521.64:551.508.25

Murty, D. S. R. (*Osmania Univ., Hydrabad*), **East-west asymmetry of cosmic rays.** *Indian Academy of Sciences, Bangalore, Proceedings, Sec. A*, 37(2):317–320, Feb. **1953.** fig., table, 13 refs. **DLC**—A triple coincidence counter telescope was used to study the east-west asymmetry of cosmic rays at Hyderabad, India (λ 7.7°$N_1H=1800$ ft). The telescope subtending an angle of 15.6° in the plane of rotation is mounted on a light wooden frame capable of rotation about a horizontal or a vertical axis. Asymmetry measurements have been made at a number of zenith angles with an interval of 15°. The asymmetry rises to a maximum of 12.3% at a zenith angle of 43° and falls off at higher angles. The results are in general agreement with those of other workers. *Subject Headings:* **1. Cosmic ray telescopes 2. Cosmic ray asymmetry 3. Hyderabad, India.**—*Author's abstract.*

5.6–141 551.521.64:537.59

Pfotzer, Georg, **Eine Nebelkammerstudie der Ultrastrahlungsschauer unter Blei in der Umgebung des zweiten Maximums der Auslösekurve.** [A cloud chamber study of the cosmic ray shower under lead near the second maximum of the release curve.] *Zeitschrift für Naturforschung*, 8a(6):353–360, June **1953.** 31 figs., 2 tables, 21 refs. **DWB**—A cloud chamber investigation near the second maximum of the Rossi curve showed no special showers comparable in effect with the normal electron showers or μ-mesons. This conclusion is discussed in connection with anomalies in the absorption coefficients of the soft component of μ rays. *Subject Heading:* **1. Cosmic ray showers.**—*C.E.P.B.*

5.6–142 551.521.64

Riddiford, L. and Butler, S. T. (*Univ. of Birmingham*), **The origin of cosmic rays in solar or stellar disturbances.** *Philosophical Magazine*, London, 7th Ser., 43(339):447–456, April **1952.** fig., 24 refs., 17 eqs. **DWB**—An idealized theory. It is shown that: 1) it seems possible that particles of cosmic ray energy are obtainable by betatron cyclic acceleration in sunspots; 2) ions will generally accelerate in trochoid-like orbits in a magnetic field, constant in space but rising linearly with time (starspots); 3) with a constant source of particles, the acceleration leads to an inverse power law. In this case, for the non-relavistic case ($T<10^9$ ev) the index in the law lies within the range 1.3–2.0, lower in the relavistic region ($T>10^9$ ev). No maximum predicted but the power law holds for the highest energy attainable, viz. 10^{13} ev for protons and 10^{15} ev for heavier particles. The results do not necessarily point to solar origin of cosmic radiation since sunspot-like phenomena may occur in other stars. *Subject Headings:* **1. Cosmic ray theory 2. Sunspots 3. Starspots 4. Cosmic particles.**—*W.N.*

5.6–143 551.521.64

Sarabhai, V.; Desai, U. D. and Kane, R. P. (*Phys. Res. Lab., Ahmedabad, India*), **Meteorological and extra-terrestrial causes of the daily variation of cosmic ray intensity.** *Indian Academy of Sciences, Bangalore, Proceedings, Sec. A*, 37(2):287–303, Feb. **1953.** 5 figs., 5 tables, 26 refs. **DLC**—Based on studies at Ahmedabad, India, of daily variations in intensities of cosmic rays and of the meson and electron components by means of vertical Geiger counter

telescopes. Intensities are corrected for daily variation in barometric pressure, making evident that the daily variation in electron intensity is due to the pressure effect. A residu variation of .3% in amplitude does exist, however, in total intensity and in meson intensit (maximum at 0900 local time). It is concluded that residual of meson intensity is not due temperature or magnetic diurnal variations but to extraterrestrial causes. *Subject Heading* **1. Cosmic ray intensity 2. Meteorological influences 3. Extraterrestrial influences 4. Al medabad, India.**—*M.R.*

AIR TEMPERATURE

See also: **Notes on International temp. scale, 1948** (Caskey), 5.6–27; **Equivalent temp.,** 5.6–30; **Advective temp. change measurement from pilot balloon observations** (Kliucharev), 5.6–39; **Instrument determining vertical temp. gradient of aerological ascents** (Kohl), 5.6–40; **Forecasted temp. and snow melt floods** (Gay), 5.6–76; **Temp. at which atmos. ice crystals and salt water droplets may coexist** (Dufour, Defay), 5.6–200; **Change of temp. on foggy day** (Yosida), 5.6–208; **Hail statistics in relation to 1950** (Houy), 5.6–236.

5.6–144 551.524.3:551.576

Kallós, Imréné, **A hömérséklet napi ingadozása különböző nagyságú felhözet esetén** [Interdiurnal temperature variations connected with different amounts of cloud cover *Időjárás*, 57(3):134–136, May/June **1953.** fig., table. Russian and French summaries p. 13 **DLC**—Maximum daily nonadvective temperature variations at Budapest are tabulated an graphically represented for each month of the year and for four different amounts of cloudine (0–2/10; 2–5/10; 5–9/10 and 9–10/10). The computation is based on data covering th period 1941–1950. The lowest values of daily temperature variation appear with a clou sky during the months Oct.–Feb. (4°C) while the highest values are found with a clear sk during May–Aug. (14°C). *Subject Headings:* **1. Interdiurnal temperature variations 2. Clou effects 3. Budapest, Hungary.**—*G.T.*

5.6–145 551.524.35(4

Jones, G. E., **The winter of 1798–9.** *Weather*, 8(12):371–375, Dec. **1953.** 4 figs., 2 re **MH-BH**—Detailed study of a severe winter at Lancaster and Bury in Lancashire. Th coldest periods were Dec. 20, 1798–Jan. 10, 1799 and Jan. 29–Feb. 9, 1799. *Subject Heading* **1. Temperature variations 2. Severe winters 3. England.**—*C.E.P.B.*

5.6–146 551.524.37:581.

Pisek, A., **Wie schützen sich die Alpenpflanzen gegen Frost?** [How do alpine plants pr tect themselves against frost?] *Umschau*, 53(21):641–643, Nov. 1, **1953.** 4 figs., 8 re **DWB**—Laboratory tests of frost resistance of cuttings of evergreen plants are tabulate showing wide differences between different species, and in the same species at different tim of year, being greatest in Dec. and early Jan. No relation was found to sugar content, b frost resistance does depend partly on drought resistance. *Subject Headings:* **1. Frost effec 2. Plant resistance to frost.**—*C.E.P.B.*

5.6–147 551.524.4:551.555

Dohrmann, Heinz, **Untersuchung über die Ursachen der Hebung und Auflösung d Passatinversion im Gebiet der äquatorialen Calmen.** [Study on the causes of the rise a dissipation of the trade inversion in the region of the equatorial calms.] Grimma, German Frdr. Bode, **1937.** 42 p. 7 figs., 16 tables, 10 refs. Photostat. **DWB**—Study based data from pilot balloons and kite ascents, made during the German "Meteor" expedition in t Atlantic. The height of the inversion varies from 900 to 1900 m, its thickness from 175 310 m. Latitudinal means are given for the specific moisture and its change within the version, as well as for the virtual and equivalent temperature. Furthermore the meridio distribution of wind speeds in different layers up to 3 km is discussed and its connection wi the dissipation height of the inversion analyzed. The rise of the inversion cannot be explain by heating from the sea surface, but is apparently caused by wind convergence. *Subj Headings:* **1. Trade inversion 2. Equatorial calms 3. Atlantic Ocean.**—*A.A.*

5.6–148 551.524.4(52)

Funahashi, Y. (*Kyushu Agricultural Experiment Station*), **Field temperatures in winter-wheat culture following the paddy rice.** *Journal of Agricultural Meteorology*, 7(3/4):108–110, Nov. 1952. fig., 3 tables, 5 refs. In Japanese; English summary p. 110. **MH-BH**—The transition of field-temperature in the warmer district of Kyushu was measured in the wheat cultivating season. The results are tabulated. Plant cover influences the vertical distribution of temperature in May. The relations between the temperature in the meteorological observation field and that in the cultivating field are approximately linear. The daily range decreasing index of soil temperature and thermal diffusivity are shown. *Subject Headings:* **1. Cover influences 2. Vertical temperature distribution 3. Surface temperatures 4. Wheat 5. Kyushu, Japan.**—*From author's abstract.*

5.6–149 551.524.4(689)

Southern Rhodesia. Meteorological Dept., **Map of mean annual surface temperature in Southern Rhodesia.** *Southern Rhodesia. Meteorological Dept., Bulletin*, No. 1694, **1952.** 1 p. map (fold.). Reprint from: *Rhodesia Agricultural Journal*, Salisbury, 49(6):382–383, Nov./Dec. **1952. DLC**—Map based on an unidentified period of 15 years, using 40 stations. Isolines at an interval of 2.5°F show mainly the effect of elevation (average lapse rate 1° per 267 ft). *Subject Headings:* **1. Temperature charts 2. Southern Rhodesia.**—*A.A.*

5.6–150 551.524.7

Gabites, J. F. and Hamlin, Ann L., **Temperatures in the upper air over the New Zealand region.** *New Zealand. Meteorological Office, Technical Note*, No. 87, May 8, **1952.** 3 p. figs., 9 tables, 5 refs. **DWB**—Temperature at the standard isobaric surfaces up to the 100 millibar level are presented for six radiosonde stations in the New Zealand region ranging from latitude 18°S to 46°S. Monthly means and variabilities are given. The variations of temperature on the standard surfaces with latitude and season are shown diagramatically. *Subject Headings:* **1. Upper air temperatures 2. New Zealand.**—*Authors' abstract.*

5.6–151 551.524.7:551.510.53

Scherhag, R., **Ein Jahr Berliner Hochaufstiege.** [A year of high ascents at Berlin.] *Annalen der Meteorologie*, 5(7/12):320, **1952. MH-BH**—A new type of American sonde and large balloon were introduced on Jan. 9, 1951. Difference of 1.5°C between noon and midnight at 30–20 mb is regarded as real. Annual variation at 40.000 m exceeded 40°C, greatest rise on Feb. 23, with change of wind to E and a solar eruption. *Subject Headings:* **1. Stratospheric temperature 2. Berlin, Germany.**—*C.E.P.B.*

SOIL TEMPERATURE

5.6–152 551.525:634.94

Orlov, A. IA., **Temperatura pochv i proizvoditel'nost' lesov.** [Soil temperature and forest productivity.] *Akademiia Nauk SSSR, Doklady*, Moscow, 91(4):957–960, Aug. 1, **1953.** 6 refs. **DLC**—Temperatures of forest soils of a series of eastern regions of the U.S.S.R. are during the vegetative stage considerably lower than the soil temperature of the central forest zones of the European parts of the U.S.S.R. The principal woody species of the eastern regions of the U.S.S.R. have developed adaptations for growing in soil with relatively low temperatures even during the period of their maximum heating. Roots of woody species are sometimes found in soil layers with temperatures of about 1°C but their number is small; most of the roots are in layers with temperatures 4–5°C during maximum heating. *Subject Headings:* **1. Soil temperatures 2. Forest climatology 3. U.S.S.R.**—*I.L.D.*

5.6–153 551.525.5

Obruchev, V. A., **Puti razvitiia merzlotovedeniia v SSSR.** [Lines of development of permafrost science in U.S.S.R.] (In: Akademiia Nauk SSSR, **IUbileĭnaia Sessiia.** v. 2:257–268, **1947.**) **DLC**—The early explorations of the 18th century revealed the existence of areas of permafrost in Arctic Asia. Other notable discoveries and investigations of the 18th, 19th and early 20th centuries are sketched and the major research projects at the Igarka, Yakutsk, Anadyr and Vorkutsk permafrost research stations, which were founded between

1935 and 1940, outlined. The chief lines of research are described and main workers in thi field mentioned. *Subject Headings:* **1. Permafrost research 2. U.S.S.R.**—*M.R.*

SEA TEMPERATURES

5.6–154 551.526.6:551.54

Eggvin, Jens, **The great exchange of water masses along the Norwegian Coast, 1940** *International Council for the Exploration of the Sea, Rapports et Procès-Verbaux des Réunions* 112:49–61, Feb. **1943.** 10 figs. **DWB**—The extremely cold winter of 1940 resulted in spectacular drop of the bottom temperature in the Vestfjord, never observed before. Th temperature previously was generally increasing at least since 1923. A number of profile characterize the hydrographic conditions along the Norwegian coast during the spring of 194 The meteorological causes of the exchange of water masses are explained by air pressure map averaged over characteristic periods. *Subject Headings:* **1. Ocean-atmosphere interactio 2. Maritime convection 3. Sea temperatures 4. Norwegian Coast 5. Vestfjord, Norway** —*A.A.*

5.6–155 551.526.6:551.311.1

Herdman, H. F. P., **The Antarctic pack ice in winter.** *Journal of Glaciology*, 2(13):184- 191, April **1953.** 9 figs., 4 refs. English and German summaries p. 184. **GB-MO**—Summar of winter conditions on edge of ice pack observed by "Discovery II," 1932–1951, is considere in association with local weather conditions and prevailing winds. Ice edge and surfac isotherms are plotted. *Subject Headings:* **1. Sea ice 2. Sea temperatures 3. Antarctica.**— *C.E.P.B.*

5.6–156 551.526.6(469

*Portugal. Serviço Meteorológico Nacional, **Temperatura da água do mar (°C) no Mont Estoril e na Praia da Rocha.** [Temperature of sea water (°C) at Monte Estoril and at Prai da Rocha.] *Portugal. Serviço Meteorológico Nacional, RT* 126, MEM 23, May 25, **1953** 2 p. tables. Also in its: *Memorias*, Vol. 11, **1953. DWB**—Monthly and annual mean dat for each month from 1940 through 1952 for Monte Estoril, and 1942–1945 for Praia da Rocha Portugal. *Subject Headings:* **1. Sea surface temperatures 2. Monte Estoril, Portuga 3. Praia da Rocha, Portugal.**—*M.R.*

PRESSURE AND WIND

PRESSURE

See also: **Influence of Coriolis force on atmos. movements** (Dedecker), 5.6–3; **Microbaric waves** (Mosetti), 5.6–71; **Barometric effect of large cosmic showers** (Citron), 5.6–139; **Exchange of water masses along Norwegian coast** (Eggvin), 5.6–154.

5.6–157 551.542/3:519.

Wadsworth, George P. (*M.I.T.*), **The power spectra of surface pressure at 35 U. S weather stations.** Massachusetts Institute of Technology. Division of Industrial Co operation, Contract AF 19(122)-446, Report No. 3, Aug. 1–Nov. 1, **1951.** 17+p. 3 figs 5 tables, refs., 40 eqs. **DWB**—This study was undertaken as a fundamental investigatio of the statistical behavior of surface pressure over the United States. Empirical representa tions of the power spectra of surface pressure at 35 weather stations scattered over the U. S have been derived and from these were obtained analytic expressions for the probability density o angular frequencies, the probability distributions of wave periods, and the theoretical auto correlation functions for each station. *Subject Headings:* **1. Pressure variations 2. Pressur distribution 3. Statistical techniques. I. Massachusetts Institute of Technology. Divisio of Industrial Cooperation II. Contract AF 19(122)-446.**—*Author's abstract.*

5.6–158 551.543:550.3

Pinar, Nuriye (*Istanbul Univ.*), **Déclenchement des séismes par brusque variation de l pression atmosphérique. Séismes de Turquie.** [Seisms triggered by sudden changes i

tmospheric pressure. Seisms in Turkey.] *I.U.G.G. Association of Seismology, Publications du Bureau Central Séismologique International, Ser. A, Travaux Scientifiques,* No. 18:61–70, 952. 3 figs., 3 refs. **DWB, DLC**—Sudden ruptures in the metastable equilibrium of two tectonic forces may be triggered by atmospheric pressure changes. In support of this widely ontested thesis the author presents three barograms and the corresponding seismograms btained in Turkey (1912 and 1939). The area in which these records were obtained has a eneral tendency for ground upheaval which (the author asserts) was promoted by the sudden nset of depressions in the three cases reported. *Subject Headings:* **1. Pressure change effects 2. Earthquake triggering 3. Turkey.**—*G.T.*

5.6–159 551.543.5

Čadež, M., **Über lokale Luftdruckänderungen in der Atmosphäre.** [On local pressure hanges in the atmosphere.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A,* (2):201–210, Dec. **1953.** fig., 16 refs., 12 eqs. German, English and French summaries . 201–202. **DLC**—The impulses which react directly on the barometer are discussed philsophically. As every change in the pressure is transmitted on all sides with a given velocity, he local pressure change results from processes in the whole atmosphere within a given distance during a preceding interval of time. An analogy is drawn with the state of the sea. *Subject Heading:* **1. Pressure changes.**—*C.E.P.B.*

TURBULENCE

See also: **Existence and uniqueness theorems relating to Navier-Stokes eq. for incompressible fluids** (Barrar), 5.6–109; **Experimental verification of turbulent transfer equations** (Halstead), 5.6–111; **Isotopic turbulence eqs. in magneto-hydrodynamics of compressible medium** (Krzywoblocki), 5.6–113; **Vortex systems subjected to certain min. conditions** (Matchinski), 5.6–114.

5.6–160 551.551

Gandin, L. S. and Dubov, A. S., **Ob opredelenii khoda koefitsienta peremeshcheniia s vysotoĭ s pomoshch'iu nabliudeniia nad rasseianiem vremen padeniia tiazhelykh chastits.** [Determination of the variation with height of the exchange coefficient with the aid of observations on the dispersion time of settling of heavy particles.] *Leningrad. Glavnaia Geofizicheskaia Observatoriia, Trudy,* 16(78):93–101, **1949.** 8 refs., 42 eqs. **DLC**—IUDIN proposed to observe the standard deviation of the falling time of heavy particles in order to compute the magnitude of the exchange coefficient, assuming a linear variation with height (z). The authors applied this approach to a model, where the exchange coefficient (K) is constant above a certain level (h), solving the differential equation

$$\frac{dq}{dt} - v\frac{\partial q}{\partial z} = K\frac{\partial^2 q}{\partial z^2} \quad (Z \geqq h)$$

$q(z,t)$—concentration of the particles (balloons); t—time; v—critical fall velocity of the particles. Combining their solution with IUDIN's results for the layer near the ground, the authors obtain:

$$K_h = \frac{(E_1 - E_2)\, v^3}{2(H_1 - H_2)},$$

K_h—the constant exchange coefficient above h; E_1, E_2—time dispersion for the first and second experiment with the heights H_1 and H_2 for the release of the particles, assuming that $H \geqslant h$. A more complicated solution is found for the case when one of the releasing heights is below h. *Subject Headings:* **1. Exchange coefficient 2. Turbulence observations. I. IUdin, M. I.**—*A.A.*

5.6–161 551.551

Inoue, Ei-ichi (*Div. of Meteorology, National Inst. of Agricultural Sciences, Nishigahara, Kita-ku, Tokyo*), **A preliminary note on the atmospheric turbulent diffusion over rough surfaces.** *Meteorological Society of Japan, Journal,* 31(1):1–5, Jan. **1953.** 7 refs., 5 eqs. **MH-BH**—Discussing characteristic features of the wind structure over rough surfaces, the author comes

to the conclusion that the velocity of the largest vertical eddy increases and its life-tim decreases with increasing roughness of the surface. Formulas are derived also for the influenc of the roughness parameter on the horizontal atmospheric diffusion. The author points ou his agreement with SUTTON's assumptions mainly regarding the dependence of the Lagrangia correlation coefficient on height and averaging time. *Subject Headings:* **1. Turbulence theor 2. Roughness parameters. I. Sutton, O. G.**—*A.A.*

5.6–162 551.551:518.251:0

Jahrestagung der Gesellschaft für angewandte Mathematik und Mechanik. [Annu meeting of the Society for Applied Mathematics and Mechanics.] *Zeitschrift für angewand Mathematik und Mechanik*, 32(8/9):229–279, Aug./Sept. **1952.** figs. **DLC**—The report the meeting at Brunswick on June 4–7, 1952, includes summaries of many of the paper Section A covers Practical analysis; B, Mathematics; C, Mathematical machines and i struments (including: A new integrating set-up, by TH. ERISMANN); D, Probability calculatio and statistics; G, Study of flow (including: A new development series for laminar boundar layers, by H. GÖRTLER; Energy distribution in flowing media, by G. HEINRICH; A new tech nique in calculating turbulent boundary layers, by J. ROTTA; Remarks on the concept of "Cri ical degree of turbulence," by H. ST. STEFANIAK). *Subject Headings:* **1. Conference 2. Mathematical techniques 3. Turbulence.**—*C.E.P.B.*

5.6–163 551.551:551.55

Jones, D. C. E., **Investigation of high altitude clear air turbulence near jet streams special flights by R.A.F. and R.A.E. aircraft.** *Great Britain. Meteorological Research Co mittee, M.R.P.*, 827, July 24, **1953.** 5 p. 9 figs., 2 tables, 4 refs. Mimeo. Also: **Weath system associated with some occasions of severe turbulence in clear air at high altitude a further analysis.** *Ibid., M.R.P.* 828, July 24, **1953.** 4 p. 2 figs., 2 tables, 2 refs. **GB-M** —Reports of turbulence at 15,000–40,000 ft in flights over British Isles are summarize Moderate or severe turbulence occurred mainly on low pressure side of jet axis and to a le extent above the axis on high pressure side. A few jet streams were not turbulent. Seve turbulence generally occurred with a vector difference >35 knots between 300 and 500 mb ar a horizontal shear on low pressure side at level of axis >0.2/hr. The second paper summariz 147 reports of clear air turbulence at 15,000–48,000 ft. Results: 71% associated with j stream (three-quarters on low pressure side), 20% with upper troughs, upper lows or stro winds, 9% not associated with any special feature. *Subject Heading:* **1. High level turbulenc** —*C.E.P.B.*

5.6–164 551.551:533.1

Kaiser, Heinz, **Die Anwendung des Reynoldschen Ähnlichkeitsgesetzes auf Strömung widerstände und Ausbreitungsvorgänge in turbulenten Grenzschichten.** [Application of t Reynolds law of similarity to flow-resistance and diffusion processes at turbulent boundaries *Meteorologische Rundschau*, 6(7/8):121–125, July/Aug. **1953.** fig., 15 refs., 22 eqs. **DWB** A formula is developed for the resistance to flow in a whole Reynolds region. At large R numbers the effective resistance of obstacles is a function of the subsidiary exchange term a well as of the form of the obstacle. Insight is obtained into the mechanism of diffusio Diffusion processes generally depend only on the exchange term; an exception is the spread impulses at obstacles, in which their form plays a part. A dimensionless number is deduce for diffusion processes, which gives, for example, the conversion factor from wind chann experiments to open country conditions. *Subject Heading:* **1. Turbulent diffusion.**—*Tran from author's abstract.*

5.6–165 551.551:551.553.3(54

*Sinha, K. L. and Sharma, H. R., **A study of winds exceeding 20 mph at Delhi.** *Indi Journal of Meteorology and Geophysics*, 4(2):145–163, April **1953.** 2 figs., 12 tables, 3 ref **MH-BH**—The location of Safdarjung airport (28°35′N; 71°12′E) whose wind record (1946–1950) are analyzed, is briefly described. Direction, velocity, duration and time-o commencement frequencies are tabulated for winds exceeding 20 mph. The material presented separately for winds (a) not associated with other weather phenomena, (b) associate

with rain or thundery conditions and (c) associated with duststorms or thunderstorms. Synoptic situations connected with strong winds are discussed. A brief comparison with winds at Allahabad is added. *Subject Headings:* **1. Wind frequencies 2. Wind data 3. Delhi, India.** —*G.T.*

5.6–166 551.551

†Takeda, Kyoiti, **Turbulence in the lowest atmosphere.** *Tokyo. Forest Experiment Station, Bulletin*, No. 58:1–36, March **1953.** 21 figs. (some fold.), 55 refs., 11 eqs. In English; Japanese summary p. 34–36. **DWB**—An extensive critical review of existing theoretical approaches to the wind profile near the ground (PRANDTL, ROSSBY and MONTGOMERY, SUTTON, SVERDRUP, LETTAU), as well as of actual measurements and empirical approaches (HELLMANN, HEYWOOD, BEST, PAESCHKE, TAKEDA, HELSTEAD, PASQUILL and others). The author prefers DEACON's formula, but slightly modified. The evaporation formula of THORNTHWAITE and HOLZMAN needs additional research. Furthermore, the author reports results of his own measurements regarding the wind profile and the statistical structure of turbulence, showing that the energy of turbulence is not constant, as it was assumed in some theories, but increases with height. The intensity of turbulence decreases at first rapidly, then slower with height. Frequency distribution and correlograms of turbulent fluctuations are discussed. LETTAU's formula gives a 30% smaller coefficient of horizontal mixing than TAYLOR's formula. *Subject Headings:* **1. Atmospheric turbulence 2. Wind profiles 3. Turbulence statistics.**—*A.A.*

5.6–167 551.551

†Washington. (State) University. Dept. of Meteorology and Climatology, **Atmospheric turbulence study.** Contract AT (45-1)-236, Occasional Report, No. 2 [and] Annual Progress Report, May 1, **1951**–July 31, **1952.** 47 p. figs., refs. at end of each section, eqs. **DWB**—A summary of work regarding atmospheric turbulence, carried out partly by graduate students. The following topics are covered: 1) Photographic study of turbulence. Theory and practice of stereophoto observation of small turbulence near the ground with due regard to fall velocities of particles. Frequency distribution of eddy velocities shows anisotropy. Correlation curves computed. 2) Dependence of eddy conductivity on height. Discussion of heat transfer equation, of observational techniques and of the determination of the coefficient of eddy conductivity which was found to be inversely related to the gradient of potential temperature. Numerical results presented. 3) The nocturnal cold layer. Lapse rates observed directly above short grass, dry sand and asphalt by means of thermocouples and an optical method. Thermoisopleths for selected 40-minute period presented. Thickness of cold layer decreases rapidly with increasing wind speed. Effect of radiation (theoretical treatment) and buoyant eddies considered. 4) Re-examination of the assumption of constant shearing stress. ERTEL's proof of constant shearing stress discussed. Problem still questionable; further experimentation necessary. 5) Electrical analogue of variable conductivity. Equations of variable electrical conductivity derived, which are identical in form with the equation for turbulent heat transfer. By changing resistance and capacity on an electrical analog the solution for heat transfer can be found for various space and time distributions. *Subject Headings:* **1. Atmospheric turbulence 2. Turbulence statistics 3. Turbulent transfer of heat. I. Fleage, Robert G. II. Badgley, Franklin I. III. Contract AT (45-1)-236.**—*A.A.*

WIND

See also: **M.S.C. shipboard wind computer** (Canada Met. Div.), 5.6–29; **Eddy flux of absolute angular momentum across equator** (Hutchings), 5.6–112; **Winds exceeding 20 mph** (Sinha), 5.6–165; **Wind direction and speed analysis related to ceiling and visibility, Cleveland, Ohio** (Farthing), 5.6–276.

5.6–168 551.552(521.84):551.588.2

Iida, T., **On the wind distribution in Hiroshima (1st report).** *Journal of Meteorological Research*, Tokyo, 4(9):663–668, Feb. **1953.** 4 figs., 5 tables. In Japanese; English summary p. (41). **MH-BH**—Wind direction and velocity observations were made at several points in Hiroshima on March 8, 1950, in order to determine local variations due to topographic effects. Observed values and the streamlines constructed from them are presented. Some general data

on the wind regime of Hiroshima are also given. *Subject Headings:* **1. Wind distributio 2. Topographic effects 3. Hiroshima, Japan.**—*G.T.*

5.6–169 551.552(2

Privett, D. W., **Some new wind charts for the South Atlantic Ocean.** *Weather*, 9(1):9–1 Jan. **1954.** fig., table, 3 refs. **MH-BH**—From monthly frequency distribution of Beaufo wind forces, 0–60°S, charts are drawn of wind speed in knots for four seasons, and their pec liarities are discussed. *Subject Headings:* **1. Wind speed charts 2. South Atlantic Ocean.** *C.E.P.B.*

5.6–170 551.552:656.61(26

Rodewald, Martin, **Ein Rückblick in die Seglerzeit.** [Looking back on sailing times *Wetterlotse*, No. 59:159–160, July **1953.** fig. **DWB**—Shows the effect of the Azores hig on the speed of sailing ships from Cornwall, England, to North America, 1893–1904. *Subje Headings:* **1. Wind fields 2. Navigation of sailing vessels 3. North Atlantic.**—*C.E.P.B.*

5.6–171 551.553.

Kadowaki, T., **Land and sea breeze at Ishinomaki.** *Journal of Meteorological Researc* Tokyo, 4(5):248–250, Aug. **1952.** 4 figs., table. In Japanese. **MH-BH**—This study includ values of monthly frequency distribution of land and sea breezes for the period 1947–194 and of the annual march of the time of day when land and sea breezes begin. Wind directio temperature, and relative humidity records for May 24, 1950, are also presented and discusse together with a 0900h weather chart for that day. *Subject Headings:* **1. Land and sea breez 2. Ishinomaki, Japan.**—*G.T.*

5.6–172 551.553.3(5

Jagannathan, P. (*Met. Off., Poona*), **Winds at Tiruchirapalli airfield and neighbourhoo** *Indian Journal of Meteorology and Geophysics*, 4(3):220–235, July **1953.** 8 figs., 5 tabl 7 refs. **MH-BH**—An examination of the hourly observations at the Tiruchirapalli airfie during the years 1945–46 and at the Tiruchirapalli cantonment during May 1943 to No 1944 is discussed. Well marked diurnal and seasonal variations found. The diurnal variati has been subjected to harmonic analysis and the characteristic features in the different seaso have been discussed. The predominant directions of wind during the different seasons, well as the frequency of winds from different directions have also been given. A preliminar examination in regard to the incursion of sea breeze at Tiruchirapalli has also been mad *Subject Headings:* **1. Wind variations 2. Tiruchirapalli, India.**—*From author's abstract.*

SPECIAL WINDS

See also: **Causes of rise and dissipation of trade inversion . . .** (Dohrmann), 5.6–147; **Trade wind clouds** (Malkus), 5.6–211.

5.6–173 551.55

Untersteiner, N., **Warum steigt der Föhn in die Täler ab?** [Why does the föhn desce into the valleys?] *Wetter und Leben*, 5(1/2):11–13, March **1953. MH-BH**—The auth reviews briefly various theories aiming to explain the displacement of cold air on the grou by warmer air flowing from above, namely the explanations of STREIF-BECKER, BILLWILL and VON FICKER, FREY, RAETHJEN, ROSSMANN and BERG. FREY's theory, which attribu the descent of the föhn to the formation of a solenoid field on the lee side during the ar cyclone stage, is effective only at the initial stage but the full development of föhn is due the formation of a barometric field on the lee side symmetrical to the air masses on the win ward side and a vortex acceleration which causes descending air flow. *Subject Headi* **1. Föhn theory.**—*I.L.D.*

5.6–174 551.55

§Fox, Roy L. (*U. S. W. B., Billings, Montana*), **Blizzards of the Northern Plains.** *Weath wise*, 5(6):123–126, 132, Dec. **1952.** 3 figs. **MH-BH**—Synoptic situations under wh blizzards generally take place are discussed. Development of a typical blizzard on J 20–22, 1952, is described and illustrated by surface and 700-mb charts. The following poi

re indicated as basic in forecasting blizzards: 1) the path which the low center takes; 2) a ufficient reservoir of cold arctic air must be present; 3) sufficient blowing snow must occur so s to reduce visibility greatly; 4) the pressure gradient must be sufficiently strong and so riented that strong northerly winds will develop. *Subject Headings:* **1. Blizzards 2. Blizzard forecasting 3. Northern Plains, United States.**—*G.T.*

5.6–175 551.555.9

Kalstrom, George W. (*U. S. W. B., Los Angeles*), **El Cordonazo—the lash of St. Francis.** *Weatherwise*, 5(5):99–103, 110, Oct. **1952.** 5 figs. **MH-BH**—El Cordonazo de San Francisco —the lash of St. Francis—is a southeasterly and southwesterly wind along the Mexican coast on the Pacific Ocean associated with tropical cyclones a short distance at sea. During the interval May–Nov. the Mexican ports on the Pacific coast show maximum wind speeds of 75 knots. The tracks of most storms parallel the coastline in a west to northwest direction for some distance. Detailed description of the behavior of the meteorological variables during these storms, of the types of storm tracks and of degree of damage caused by them are given. Maps showing tropical storm tracks for the period 1947–51 and for typical storm tracks for 1947–1951 (Sept., May, Aug. and Oct.) are included. *Subject Headings:* **1. Cordonazo 2. Tropical storms 3. Pacific Coast 4. Mexico 5. Southern California.**—*I.L.D.*

WIND EFFECTS

See also: **Regularity of changes of energy scattering in stationary wind flow over Baltic** (Moroshin), 5.6–115; **Precip. amount in Gotland** (Pershagen), 5.6–218; **Increasing precip. by shelter belts** (Szilágyi), 5.6–224.

5.6–176 551.556.2:551.311.3

Egerszegi, Sándor, **A szélerózió (defláció) leküzdése erdősávrendszerrel.** [Prevention of wind erosion (deflation) by means of shelter belts (last paper)]. *Időjárás*, 55(7/8):210–215, July/Aug. **1951.** refs. **DLC**—The problem of optimum angle of shelter belts in relation to the prevailing wind direction is discussed. A soil conservation scheme is proposed which combines the use of shelter belts with proper fertilizing and cultivation methods aimed at increasing the wind resistivity of the soil. *Subject Headings:* **1. Wind erosion 2. Shelter belts 3. Soil conservation.**—*G.T.*

5.6–177 551.556.2:551.584.42

Gorshenin, N. M., **Razmeshchenie polezashchitnykh lesnykh polos na poliakh kolkhozov i sovkhozov.** [The distribution of shelter belts in the fields of collective and state farms.] *Les i Step'*, Moscow, 8:30–36, **1951.** 4 figs., refs. **DLC**—Modification of snow and wind distribution by shelter belts is discussed, giving also some results of observations. *Subject Headings:* **1. Microclimate of fields 2. Shelter belts.**—*A.A.*

5.6–178 551.556.2:621.311.2:631.6

Grigor'ev, A. A., **Soviet plans for irrigation and power: a geographical assessment.** *Geographical Journal*, 118(2):168–179, June **1952.** 2 figs. **DWB**—A summary of the methods for retaining soil moisture in the semiarid regions of S. Russia is followed by a detailed account of the Stalin plan for combined irrigation, navigation and power plant works on the rivers and afforestation to provide shelter belts. Research on the climatic effect of windbreaks is described. *Subject Headings:* **1. Power systems 2. Irrigation 3. Shelter belts 4. U.S.S.R.** —*C.E.P.B.*

5.6–179 551.556.2:63

Horváth, Ferenc, **Erdősávok hatása a mezőgazdasági kultúrákra.** [Effect of shelter belts on farm crops.] *Időjárás*, 57(1):20–25, Jan./Feb. **1953.** **DLC**—The author estimates amounts of crop decrease due to interception of light by shelter belts. He believes that the contribution of shelter belts to the conservation of soil moisture and reduction of wind more than compensates for their harmful effect. Several experiments are suggested which would help to obtain detailed information on light requirements of various plants, on their resistance to mildew and on optimum structure of shelter belts. The author also stresses the importance

of impressing farmers with the usefulness of shelter belts. *Subject Headings:* **1. Shelter be effects 2. Crop yield.**—*G.T.*

5.6–180 551.556.2:551.57

Kashiyama, Tokuji; Takahashi, Kikumatsu and Kitamura, Kaichi, **On the capture of se fog particles by a model shelterbelt.** *Tokyo. Forest Experiment Station, Bulletin*, No. 63:1–(July **1953.** 2 plates, fig., table, 10 refs. In Japanese; English summary p. 6. **DWB**—O grassland in the coastal fog belt of Hokkaido, a model shelterbelt was built of white fir an Sakhalin spruce, 2 m high and 13 m wide. The distribution of fog water content in the neigh borhood of the model hedge was investigated. It is estimated that fog water captured dow to the ground by model trees would amount to approximately 1 mm per hour near the windwar edge of the belt, assuming that fog water content and wind velocity in the open average 0.3 g/m³ and 3.4 m/sec, respectively. This effect, accordingly, should be considered as factor in connection with the contribution of forests to headwater conservation in uplan regions frequented by fogs. *Subject Headings:* **1. Shelter belts effects 2. Fog 3. Water con servation 4. Forest influences.**—*Authors' abstract.*

5.6–181 551.556.2:6

Kreutz, Wilhelm, **Neue Erkenntnisse auf dem Gebiete des Windschutzes.** [Ne information about wind protection.] *Germany. Deutscher Wetterdienst in der US-Zon Berichte*, No. 32:59–67, **1952.** 13 figs. **DWB**—Soil and plants can be protected from harmf wind influences by hedges, artificial wind screens and special cultivation methods. The win protection improves the water economy. Higher yields were observed with various crop The best relative results are obtained from plants with higher moisture requirements. *Subje Headings:* **1. Wind protection 2. Windbreak effects 3. Agricultural meteorology.**—*A.A.*

5.6–182 551.556

Lawrence, E. N., **The effects of a windbreak on the speed and direction of wind.** *Gre Britain. Meteorological Research Committee, M.R.P.*, 797, April 22, **1953.** 7 p. 25 figs 8 refs., 2 eqs. Mimeo. **GB-MO**—Observations at Manby, Lincolnshire, with lattice an slat windbreaks 50 ft high, 1600 ft long and 10 ft wide are described. Winds were measur with cup anemometers on telescopic ladders, no-lift balloons and smoke candles, with surfa winds of 9–30 m.p.h. at various angles of incidence, in unstable and neutral or stable ter perature lapse. Results are presented in numerous horizontal and vertical sections showin contours of ratio of observed wind at any point to undisturbed wind at 50 ft. Eddying conc tions are discussed and conclusions summarized. *Subject Heading:* **1. Windbreak effects.**— *C.E.P.B.*

5.6–183 551.556.2:6

Lhota, Otakar and Uhlíř, P., **Vliv lesních pásů na klima a zemědelskou produkci.** [Th influence of shelter belts on climate and agricultural production.] *Za Socielistické Zemědělstv* Prague, 2(11):1249–1258, Nov. **1952.** 6 figs., 6 tables. **DLC**—Several favorable aspec of the effect of shelter belts are discussed and corroborated by numerical examples. Th tables presented show the effect of shelter belts on wind speed, transpiration, atmospher water vapor content, wind erosion and amounts of various crops. Reduction of wind spe on the windward and leeward side of a windbreak is graphically illustrated. *Subject Heading* **1. Shelter belt effects 2. Crop yield.**—*G.T.*

5.6–184 551.556.2:551.5

*Luncz, Géza, **A mezővédő erdősávok éghajlati hatásának mérése 1951-ben.** [Measur ment of the climatic effect of shelter belts in 1951.] *Időjárás*, 56(9/10):285–295, Sept./Oc **1952.** 17 figs. Russian and French summaries p. 326–327. **DLC**—Micrometeorologic measurements conducted intermittently since Feb. 1951 by the Hungarian Forestry Scien Institute are reported. Wind speed and direction, evaporation, relative humidity, soil moistu and air and soil temperature data were obtained on several occasions during 2–5-day perio on both sides of three shelter belts of different type and orientation. Results of these measur ments and also of crop yield are graphically represented as functions of distance from t

helter belts. The author offers advice on methods to be adopted in the further pursuit of the project. *Subject Headings:* **1. Shelter belt effects 2. Microclimatic data 3. Hungary.**—*G.T.*

UPPER AIR WINDS

See: **Vertical velocities in vicinity of jet stream** (Endlich), 5.6–117; **High altitude clear air turbulence near jet stream** (Jones), 5.6–163.

VERTICAL MOTION

5.6–185 551.558.21:797.5

Rowell, Betty, **Table Mountain wave.** *Gliding*, London 4(1):8–9, Spring **1953.** port., diagr. **DWB**—The mechanism of the wave (near Cape Town) is explained by its discoverer. A sketch of the region, a description of a flight up to 10,000 ft and the author's portrait are included. *Subject Headings:* **1. Standing waves 2. Gliding 3. Table Mountain, South Africa.**—*G.T.*

5.6–186 551.558.21

Scorer, R. S., **Lee waves.** *Weather*, 8(7):224, July **1953.** 2 refs. **MH-BH**—Note on relation of lee waves to stability and correction to earlier article (*see item* 2.6–92, June 1951 *MAB*). *Subject Heading:* **1. Lee wave forecasting.**—*C.E.P.B.*

5.6–187 551.558.21

Wallington, C. E., **A lee-wave scale.** *Royal Meteorological Society, Quarterly Journal*, 79(342):545–547, Oct. **1953.** 2 figs., 3 refs., 9 eqs. Also in: *Gliding*, London, 4(3), Autumn **1953. DWB**—R. S. SCORER's parameter l is fundamental in wave phenomena and a quick practical method of finding it from temperature and wind data is described. *Subject Heading:* **1. Lee waves.**—*C.E.P.B.*

5.6–188 551.558.21

Ward, F. W., **Helm-wind effect at Ronaldsway, Isle of Man.** *Meteorological Magazine*, London, 82(974):234–237, Aug. **1953.** 2 figs., 3 tables, ref. **MH-BH**—Rapid changes of wind direction and unexpectedly strong winds on the airport, and cloud bar effects, on July 28, 1952, are attributed to a helm-wind effect similar to that on Crossfell. *Subject Headings:* **1. Helm winds 2. Ronaldsway, Isle of Man.**—*C.E.P.B.*

5.6–189 551.558.29:551.511:551.509.39

†§Miller, James E., **Studies of large scale vertical motions of the atmosphere.** *New York Univ. College of Engineering, Meteorological Papers*, 1(1), **1948.** 49 p. 10 tables, 12 diagrs., refs., eqs. **DWB**—Different techniques for determining large scale vertical motions in the atmosphere are discussed theoretically, and applications given. The use of isobaric charts, isentropic charts, kinematic analysis charts of upper wind patterns, etc. are treated separately. Causes of vertical motion, effects on cyclo- and anticyclogenesis and on the tropopause, and, finally, application to objective forecasting, problems of large scale eddy diffusion and five-day forecasting are considered. *Subject Headings:* **1. Vertical motion 2. Mechanics of the atmosphere 3. Objective forecasting.**—*M.R.*

AQUEOUS VAPOR AND HYDROMETEORS

HUMIDITY AND EVAPORATION

See also: **Psychrometer tables** (Canada Met. Div.), 5.6–32; **Psychrometric diagram** (Swiokte), 5.6–33; **Psychrometric tables and charts** (Zimmermann), 5.6–34; **Reduction of averages of vapor pressure to sea level** (Tunnell), 5.6–35; **Saturation deficit of atmos., U.S.S.R.** (Sokolova), 5.6–192.

5.6–190 551.571:532.77

†*Kientzler, C. F. and Arons, A. B., **Vapor pressure of sea salt solutions.** Woods Hole Oceanographic Institution, Contract Nonr-798(00) (NR-085-001), Sea-Salt Nuclei Studies,

Technical Report, No. 2, Oct. **1952.** 23 p. 10 figs., tables, 17 refs. p. 22–23. **DWB**— Saturated vapor pressure of sea salt solutions from freezing point to 30°C measured direct for the first time and combined with measurements made by HIGASHI and others from 30 t 175°C. The technique and apparatus used are described in detail. Natural sea water wa used for samples, concentrating it up to a saturated solution. Original data are presente as well as a table of smoothed values for practical use for chlorinity for 5% and each 10% up t 160% vs temperature for each 5°C from −10 to 35°C and for each 25°C from 0 to 175°C *Subject Headings:* **1. Vapor pressure 2. Sea water. I. Contract Nonr-798(00) (NR-85-00 II. Woods Hole Oceanographic Institution III. Higashi, K. K.**—*A.A.*

5.6–191 551.571:676

Sheppard, H. L., **A note on chart distortions.** *Institute of Navigation, Journal*, (62):15 160, April **1953.** fig. **DLC**—Apparent distance between 2 points on a map, measured with straight edge increased by 1% with increase of relative humidity from 35–100%. Temperatu effects irregular and insignificant. *Subject Heading:* **1. Humidity effects.**—*C.E.P.B.*

5.6–192 551.571:551.573 551.582.2(4

*Sokolova, E. M., **Nedostatok nasyshcheniia vlagoiu vozdukha na territorii SSSR.** [Sa uration deficit of the atmosphere over the U.S.S.R.] *Leningrad. Gosudarstvennyĭ Gidr logicheskiĭ Institut, Trudy*, No. 4, **1937.** 82 p. 9 figs., numerous tables and maps. **DLC**— One of the very few monographs on the distribution of the saturation deficit (Δe) over lar areas, published primarily for the computation of evapotranspiration. Δe was compute from monthly means of temperature and humidity adjusted to long period means, but n to a uniform period, applying the OL'DEKOP correction due to the nonlinear dependence of t saturated water vapor pressure on temperature. Data presented for 659 stations. Ma given for the annual distribution as well as for Jan. and July, covering the whole Union a also, in greater detail (1:5,000,000), for the European part including Finland, part of t Baltic countries and Poland. The text presents an interesting discussion of the influence cities, forest clearings, valleys, mountains and water surfaces. *Subject Headings:* **1. Saturati deficit 2. Climatic data 3. Climatic charts 4. Topographic influences 5. U.S.S.R.**—*A.A*

5.6–193 551.573:551.5

Bergsten, Folke, **Contribution to study of evaporation in Sweden.** *I.U.G.G. Int national Association of Scientific Hydrology, Brussels*, 1951, [*Transactions*], 3:443–451, 19 8 figs., 3 tables, 11 refs., eqs. **DWB**—The author proved on the basis of the water balance 8 Swedish catchment areas that a definite correlation exists between the annual evapotra piration and the summer temperature, which increased considerably during the period und investigation (1918–47). Mean data and correlation coefficients presented. *Subject Headin* **1. Hydrologic cycle 2. Evapotranspiration 3. Sweden.**—*A.A.*

5.6–194 551.573:551.585(41

*Guerrini, V. H., **Evaporation and transpiration in the Irish climate.** *Eire. Meteorologi Service, Technical Note*, No. 14, June **1953.** 34 p. 16 figs., 6 tables, 14 refs. **DWB**—Thor thwaite's formula for the computation of potential evaporation as a function of monthly me temperatures and length of day was tested for conditions in Ireland, comparing computed wi measured runoff, and found inadequate. The author does not propose another approach the problem, but introduces a general adjustment for the winter months and presents rainf minus evapotranspiration maps for the months March–Oct., as well as maps of accumulat withdrawals of moisture from soil reserves at the end of the months June–Oct. for the wh of Ireland. A battery of evapotranspirometers has been in operation at Valentia since Ju 1952. *Subject Headings:* **1. Evapotranspiration 2. Evapotranspirometers 3. Runoff 4. Thor thwaite's formula 5. Valentia, Ireland.**—*A.A.*

5.6–195 551.573:551.511:551.311

†*Hoinkes, H. and Untersteiner, N. (*Meteorological Inst., Innsbruck*), **Wärmeumsatz u Ablation auf Alpengletschern. I. Vernagtferner (Ötztaler Alpen, August 1950).** [He

alance and ablation on Alpine glaciers. Vernagtferner (Ötztal Alps, Aug. 1950).] *Geografiska Annaler*, 39(1/2):99–158, 1952. 15 figs., 16 tables, bibliog. p. 156–158, 15 eqs. English summary p. 153–155. **DWB**—"A comprehensive study of the quantitative effects of short wave radiation, convective heat transfer, evaporation, condensation and the heat supplied by liquid evaporation or ablation," carried out on the Vernagtferner glacier at a height of 2,973 m. Ablation shows a marked intradiurnal variation in that 92% of the total measured ablation occurs while the sun is above the horizon. Short wave radiation seems to exert the maximum effect upon ablation. The theoretical bases and the measurement methods for determining the radiation balance, the convective heat flow towards the ice taking into account both wind velocity and Austausch, air temperature and air humidity are discussed in great detail and the results of measurement are given in tables; the total heat balance is calculated separately for periods with or without short wave radiation. It is shown that for the period Aug. 21–31, 1950, 80% of all ablation can be accounted for by short wave radiation. *Subject Headings:* **1. Heat balance 2. Glacial ablation.**—*I.L.D.*

5.6–196 551.573

Mansfield, W. W., **Effect of surface films on the evaporation of water.** *Nature*, London, 172(4389):1101, Dec. 12, **1953.** 5 refs. **DWB**—Surface films diminish rate of evaporation from water surfaces in the laboratory, but not usually in the open. The reason given is that restriction of evaporation leads to a rise of surface temperature and a compensating increase of evaporation. *Subject Heading:* **1. Evaporation theory.**—*C.E.P.B.*

5.6–197 551.573:551.508.72

Ramage, C. S., **Evapotranspiration measurements made in Hong Kong. First Report, Oct. 1951 to May 1953.** *Hong Kong. Royal Observatory, Technical Notes*, No. 7, June **1953.** 9 p. 3 figs., table, 2 refs. Also in: *Johns Hopkins Univ. Laboratory of Climatology, Publications in Climatology*, 7(1):112–124, **1954. DWB**—A simplified evapotranspirometer as described by MATHER in 1950 was installed at Hong Kong. Results of measurements, made over 20 months, are given for grass cover and different vegetables, comparing these with temperature, humidity, wind, etc. THORNTHWAITE's formula gives a higher annual evapotranspiration and does not agree with the annual course of potential evapotranspiration due to the well marked annual variation of relative humidity in Hong Kong (wet monsoon summers, dry winters). *Subject Headings:* **1. Evapotranspiration 2. Thornthwaite's formula 3. Evapotranspirometers 4. Hong Kong.**—*A.A.*

5.6–198 551.573:551.579.5:631.6

van Bavel, C. H. M. and Wilson, T. V., **Evapotranspiration estimates as criteria for determining time of irrigation.** *Agricultural Engineering*, St. Joseph, Mich., 33(7):417–418, 420, July **1952.** 2 figs., 2 tables, 11 refs. **DLC**—Comparisons of soil moisture measurements with estimates based on evapotranspiration calculated from long term averages (THORNTHWAITE, PENMAN, and BLANEY and CRIDDLE methods compared for Raleigh and Chapel Hill, N. C.) show little significant difference. An example of a daily soil moisture balance sheet, used for a tobacco field in Ruston coarse sandy loam, shows how dates for irigation as determined from tensiometer readings seldom vary by more than 1 day from those estimated from evapotranspiration. *Subject Headings:* **1. Soil moisture measurements 2. Evapotranspiration estimates 3. Irrigation 4. Raleigh, North Carolina. I. Thornthwaite, C. W.**—*M.R.*

5.6–199 551.573:551.311.12(987)

Ward, William H., **The physics of deglaciation in Central Baffin Island.** *I.U.G.G. International Association of Scientific Hydrology, Brussels, 1951, Transactions*, 1:237–245, **1952.** 7 figs., 5 refs. **DWB**—Report on some glaciological studies of the Baird Expedition, 1950, given in descriptive form. Special attention is paid to the melting out of rock debris, its effect on the further melting process, seasonal slipping of the debris, etc. *Subject Headings:* **1. Glacial ablation 2. Arctic expeditions 3. Baird Expedition, 1950 4. Baffin Island.**—*A.A.*

CONDENSATION

5.6–200 551.574.1:551.52

Dufour, L. and Defay, R., **Températures de coexistence de cristaux de glace et de goutte salées dans l'atmosphère.** [Temperatures at which atmospheric ice crystals and salt-wat droplets may coexist.] *Belgium. Institut Royal Météorologique, Publications, Ser. B*, No. **1952.** 19 p. fig., refs., 37 eqs. **DWB**—General formulas are developed for calculating th temperature at which both ice crystals and salt-water droplets may be found in the atmospher The values considered in setting up the formulas are crystal and droplet radius, atmospher pressure and degree of solution. The functions are worked out for the case of crystals an droplets suspended in the air and also for crystals totally or partially contained in a salt-wat droplet suspended in the air. *Subject Headings:* **1. Freezing temperatures 2. Ice crysta 3. Saline nuclei.**—*G.T.*

5.6–201 551.574.1:535.3

Kamiyama, K. and Moriguchi, M., **Infra-red spectrometry of condensation nucle** *Papers in Meteorology and Geophysics*, Tokyo, 3(4):307–312, March **1953.** 2 figs., 5 ref **MH-BH**—Near infra-red rays (1.307 and 1.216μ) which have no connection with the absorptio band of water vapor were applied to fog produced with adiabatic expansion in an expansio chamber. From the ratio of the light transmission of each wave length the sizes of fog pa ticles were estimated. The effect of AgI and NaCl nucleation on light attenuation and th effect of ultraviolet irradiation on AgI and NaCl nucleation are investigated. *Subject Heading* **1. Cloud chambers 2. Condensation nuclei 3. Infrared spectrometry.**—*Authors' abstract.*

5.6–202 551.574.1:551.4

*Köhler, Hilding and Bath, Markus, **Quantitative chemical analysis of condensation nucl from sea water.** *Vetenskaps-Societeten i Upsala, Nova Acta, 4th Ser.*, v. 15(7), **1953.** 24 7 figs., tables, refs. p. 24. Also issued as: *Uppsala. Universitet. Meteorologiska Instit tionen, Meddelande*, No. 31. **DWB**—Sea water artificially dissolved in laboratory in order determine chlorinity, magnesium and sodium in condensation nuclei. Experimental arrang ment and chemical methods used are described. Data of the chemical analysis of the nuc given in detail. Mean Mg/Cl and Na/Cl ratios are somewhat smaller in droplets than in s water, the deviation for Na/Cl being significant. Frequency distributions for Mg/Cl ra are shown. *Subject Headings:* **1. Saline nuclei 2. Chemical analysis of condensation nuc 3. Laboratory experiments.**—*A.A.*

5.6–203 551.57

Kuroiwa, Daisuke, **Electron-microscope study of atmospheric condensation nucl** (In: Sapporo, Japan. Hokkaida University. Institute of Low Temperature Science, **Studi on fogs in relation to fog-preventing forest. 1953.** p. 349–382. 13 figs., 2 tables, 10 plat 24 refs.) **DWB**—Previous investigations on the role of aerosol particles in the condensati of atmospheric moisture are reviewed briefly and the procedure for examining fog nuclei means of the electron microscope is outlined. The author investigated the properties condensation nuclei in mountain and sea fogs, the properties of nonhygroscopic nuclei and t relationship between the size of fog droplets and condensation nuclei. Diagrams of t apparatus and photographs of condensation nuclei are included. *Subject Headings:* **1. F nuclei 2. Condensation nuclei 3. Electron microscopes.**—*I.L.D.*

5.6–204 551.574.1:551.578

†McDonald, James E., **Homogeneous nucleation of supercooled water drops.** *Jour of Meteorology*, 10(6):416–433, Dec. **1953.** 3 figs., 3 tables, 43 refs., 10 eqs. **MH-BH**—T lengthy paper examines the theory of nucleation. Previous efforts to explain the obser rapid crystallization at −40°C are examined critically and numerous significant errors pointed out. The theoretical nucleation rate is very sensitive to the numerical value adop for the specific free energy of a water-ice interface, but the difficulties of estimating this found to be very great, especially the direct calculation of the distortion energy of ice. Af a crude correction for this, a theoretical temperature of −26°C is found for the spontane nucleation of drops of 10 micron radius. This is so much nearer the observed −40°C than

ther estimates that it is considered to strengthen the belief that this transition is due to spontaneous nucleation. *Subject Headings:* **1. Nucleation theory 2. Supercooled water drops.**—*C.E.P.B.*

5.6–205 551.574.1:551.521.63

†McHenry, J. J. and Twomey, S. (*Physics Dept., Univ. College, Cork*), **Condensation nuclei produced by ultraviolet light.** *Royal Irish Academy, Dublin, Proceedings, Sec. A*, 55(3):51–59, May **1952.** table, 30 refs. **DWB**—Critical wave length for nucleus production probably between 2345 and 2378 Å and certainly between 2345 and 2399 Å, according to experiments with light transmitted through filters. Numbers of condensation nuclei produced in different gaseous atmospheres studied. It seems likely that ammonia causes the production of condensation nuclei by ultraviolet air in ordinary moist air. The absorption spectra of the constituents of the atmosphere are described and the mechanism of nuclei formation is outlined. *Subject Headings:* **1. Condensation nuclei 2. Ultraviolet light 3. Ammonia nuclei.**—*A.A.*

5.6–206 551.574.1

Wylie, R. G., **The properties of liquid phase embryos at the interaction of plane solid surfaces.** *Australian Journal of Scientific Research, Ser. A, Physical Sciences*, 5(4):618–627, Dec. **1952.** 2 figs., 12 refs., 22 eqs. **MH-BH**—In order to calculate the probabilities of nucleation of liquid droplets at different types of site on a solid surface, the properties of embryonic droplets which may exist in complete thermodynamic equilibrium at those sites must be known. The general properties of liquid embryos formed on a plane solid surface, or at lines or points of intersection of plane solid surfaces are considered. It is shown that, although an edge free energy associated with the boundary line may substantially affect the properties of embryos at small contact angles, the effect is probably not large, for embryos of the sizes of interest, when the contact angle is larger than about $\pi/4$. The areas, volumes, total surface free energies, and free energies of formation are found for embryos at these sites as functions of the contact angle, any edge free energies being neglected. The extension to the formation of bubbles at plane solid surfaces in a pure liquid is indicated. The results are applied in a following paper to the kinetics of condensation of vapor at an imperfect crystalline surface. *Subject Heading:* **1. Condensation nuclei.**—*Author's abstract.*

FOG

See also: **Capture of sea fog particles by model shelter belt** (Kashiyama, others), 5.6–180.

5.6–207 551.575:551.588.6

Sapporo, Japan. Hokkaido University. Institute of Low Temperature Science, **Studies on fogs, in relation to fog-preventing forest.** Ed. by Takeo Hori. Sapporo, Japan, Tanne Trading Co., **1953.** 399 p. figs., plates, tables, refs., eqs. **MH-BH**—A collection of 25 papers dealing with the sea fogs occurring in southeast Hokkaido is the outcome of research carried out by the Institute of Low Temperature Science of Hokkaido University for the Forestry Section of Hokkaido Perfecture which requested data on the role played by forests in capturing fog particles and thus acting as a fog barrier. The studies cover the mechanism of advection fog formation, the capture of fog particles by the forest and the role of turbulence in this process, fog meter, liquid water content of fog, electron microscopic studies of fog particles, etc. The papers will be abstracted individually. *Subject Headings:* **1. Advection sea fog 2. Fog prevention 3. Atmospheric turbulence 4. Forest influences 5. Fog particles 6. Japan. I. Hori, Takeo** *(ed.)*.—*I.L.D.*

5.6–208 551.575:551.524.31

Yosida, Zyungo, **A theoretical study on diurnal change of air and ground temperature on a foggy day.** (In: Sapporo, Japan. Hokkaido University. Institute of Low Temperature Science, **Studies on fogs in relation to fog-preventing forest. 1953.** p. 69–80. 4 figs., 5 refs., 13 eqs.) **MH-BH**—The change of ground and air temperature near the ground surface in daylight hours is dealt with theoretically for the case where an advection fog comes from over the sea and intrudes into a wide field. The origin of the heat that gives rise to the tem-

perature change is sought for directly in the solar radiation. The air temperature near th ground surface is given by a mathematical series composed of terms of the form $\sqrt{X^n} f_n(t$ where t and X are time and distance from the seashore, respectively. The functions $f_n($ are expressed by linear combinations of functions which are represented by curves shown in th annexed figures. *Subject Headings:* **1. Advection sea fog 2. Diurnal temperature variation** *—Author's abstract.*

5.6–209 551.575.3

Kinoshita, Seitti and Omoto, Yukio, **Statistics of fogs at Nemuro.** (In: Sapporo, Japa Hokkaido University. Institute of Low Temperature Science, **Studies of fogs in relation fog-preventing forest. 1953.** p. 25–33. 9 figs., table, 2 refs.) **MH-BH**—A statistic analysis of the fogs observed at the Nemuro Meteorological Observatory during the perio 1947–51. Statistics are given on the incidence of fogs, their period of duration, time of appea ance and disappearance of fogs, on the distribution of foggy hours per day and number foggy hours in each month of a year. A comparison is made between the fogs at Nemu and other localities in Japan. A relationship between the number of fogs (n) and their dur tion (T) is established: $\log_{10} n = -0.12\ T + 2.5$. The data are given in histograms and tables. *Subject Headings:* **1. Fog frequencies 2. Hokkaido, Japan.**—*I.L.D.*

CLOUDS

See also: **Interdiurnal temp. variations** (Kallós), 5.6–144.

5.6–210 551.576.

*Malkus, Joanne Starr, **Some results of a trade cumulus cloud investigation.** *Journal Meteorology*, 11(3):220–237, June **1954.** 17 figs., 6 tables, 12 refs., 13 eq. Also in: Woo Hole Oceanographic Institution, Contract N6onr-27702 (NR-082-021), Marine Meteorolog Technical Report, No. 23, May **1953.** 46 p. 20 figs., 9 tables, refs. p. 39–40. **DWB**—Cro sections through two trade cumulus clouds are presented, showing the temperatures, tu bulence, and water vapor content of the clouds and their nearby environment, the cloud slop and the external wind profile. The two clouds were studies over the Caribbean Sea on t same afternoon in June, 1952, and were in widely differing phases of their life cycles. T measurements were made from a slow-flying aircraft equipped with sensing instruments a whose behavior as a meteorological tool had been previously studied. Numerous calculatio are made from the cross sections, including total and dynamic entrainment, drafts, slop and liquid water content. These are, where possible, checked against the correspondi observations. In addition to testing previously evolved theoretical models, and the usefuln of the steady-state hypothesis, the data provide some evidence concerning the formation a growth of larger trade cumulus clouds from several smaller ones and by successive stag *Subject Headings:* **1. Cumulus clouds 2. Cloud formation. I. Woods Hole Oceanograph Institution II. Contract N6onr-27702 (NR-082-021).**—*Author's abstract.*

5.6–211 551.576.12:551.555

Malkus, Joanne Starr, **Trade-wind clouds.** *Scientific American*, 189(5):31–35, No **1953.** 6 figs. **DWB**—This article contains a lucid description of current ideas regarding t mechanism of cumulus cloud development in the trade wind area, including an exposition the new theory of entrainment which accounts for shallower development and earlier dissipati of isolated cumuli, in comparison with groups of trade wind cumuli (which frequently me and develop to great heights). Numerous flights through trade wind clouds were made in t West Indies, and the resulting models and cross sections considerably revise the simpler b less realistic models of a few years ago. *Subject Headings:* **1. Trade wind cumulus clou 2. Entrainment in cumulus 3. Cloud circulation models 4. West Indies.**—*M.R.*

5.6–212 551.57

Parczewski, Władysław, **Osobliwe ksztalty chmur.** [Special forms of clouds.] *Gaz Obserwatora PIHM*, Warsaw, 4(8):1–6, Aug. **1951.** 12 figs. **DLC**—Deals with the formati of some rather unusual cloud forms. Consecutive phases of development and changes occurri in the configuration of clouds with vertical development, cumulus and cumulonimbus,

untering inversion and to a lesser degree isothermal air layers, are described and discussed. separate case of various aspects of lenticular, undulatory, "grape" and mammatus clouds bserved by the author are depicted and commented on. Many pictures and graphs are ncluded. *Subject Headings:* **1. Cloud forms 2. Cloud formation 3. Cloud photographs.**—*M.P.*

5.6–213 551.576.1(779)

Scorer, R. S., **All in one day.** *Weather*, 8(2):40–41, Feb. **1953.** 10 photos. **MH-BH**—escription with photos of cloud forms in Pyrenees, July 15, 1952. *Subject Headings:* **1. Cloud hotographs 2. Pyrenees.**—*C.E.P.B.*

5.6–214 551.576.12

Scorer, Robert S., **Stratocumulus parasols.** *Gliding*, London, 4(3):124, Autumn **1953. WB**—The mechanism of the spreading out of cumulus into stratocumulus is explained. he author suggests that "given a stable layer in which spreading-out is possible, the best iterion for spreading-out is whether the isobars are curved cyclonically or not." Cyclonic rvature will favor and anticyclonic curvature inhibit the formation of "parasols." *Subject eadings:* **1. Stratocumulus 2. Cloud forms.**—*G.T.*

PRECIPITATION

See also: **Does 1-wet–2-dry pattern foretell 1953 as another dry year?** (Floyd), 5.6–75; **Estimates of vertical velocity based on vorticity eq.** (Sherman), 5.6–128; **Flood catastrophe, Nov. 1951, Po Valley** (Marchi), 5.6–239; **Peruvian rainfall climate** (Putnins, others), 5.6–248.

5.6–215 551.577.2(62):551.577.3:551.515.8

Soliman, K. H., **Rainfall over Egypt.** *Royal Meteorological Society, Quarterly Journal*, 9(341):389–397, July **1953.** 5 figs., 2 tables, 5 refs. **DWB**—Distribution of mean annual ainfall over Egypt is mapped, annual and diurnal variations of amounts and numbers of days re shown by graphs and maximum falls in 24 hrs listed. A little rain occurs with cold fronts ncluding minor early morning fronts due to land breeze) but nearly all is due to upper cold roughs or lows, associated either with Mediterranean depressions (winter) or small desert ows (spring and autumn). *Subject Headings:* **1. Precipitation distribution 2. Rainfall ariations 3. Egypt.**—*C.E.P.B.*

5.6–216 551.577.21(431/5)

*Hoffmeister, J., **Die durchschnittliche Veränderlichkeit der Niederschlagsmenge in Nordwestdeutschland.** [The average variability of the amount of precipitation in northwest Germany.] *Zeitschrift für Meteorologie*, 7(4):109–117, April **1953.** 2 figs., 6 tables, 2 refs. **MH-BH**—On the basis of 80 year pentad values the author investigated the mean variability f precipitation amounts for selected sections in Germany (Löningen, Hannover, Göttingen nd Claustaal). The absolute mean variability and relative mean variability were calculated or each of 73 periods of the year; the calculated values, as well as the 80 year means for each tation are given in tables. Graphic analysis of the data shows that curves of the annual ariation of precipitation amount and of absolute mean variability are in general agreement ut that the latter is generally somewhat smaller and the difference increases with increasing recipitation amounts; accordingly the percent mean variability varies within narrow limits n the course of the year. An equation for calculating the relative mean variability is included. *Subject Headings:* **1. Precipitation variability 2. Germany.**—*I.L.D.*

5.6–217 551.577.21:551.556(485)

Pershagen, Helge, **Nederbördens storlek pa Gotland.** [Precipitation amount at Gotland.] *Grundförbättring*, Uppsala, 4(3):146–149, **1950/1951.** charts. **DLC**—The basic esults of the quantitative precipitation distribution were obtained through daily observations n the months of May–Oct. 1933–1949, and are presented in three charts. The precipitation luring May–Oct. was larger than during Nov.–April. Wind directions in winter were SE and NE 35% of the time, whereas in summer the direction was W or WSW. Summer precipitation

is mainly convective, comes in showers independently from air pressure distribution and wi direction, which in winter plays a role since the precipitation is then advective. *Subj Headings:* **1. Precipitation amounts 2. Wind effects 3. Gotland, Sweden.**—*W.N.*

5.6–218 551.577.3:551.51

Abdullah, Abdul J., **A note on the periodicity of some frontal precipitation.** *Journal Meteorology*, 10(3):228–230, June **1953.** 3 refs., 4 eqs. **MH-BH**—A radar film of para bands of pre-warm-front precipitation is discussed. They are attributed to groups of grav waves at the frontal surface and a group-velocity formula is given for speed of progress of bands. In one case (Boston, Dec. 15–16, 1947) the calculated period of recurrence was 46 m compared with observed period of 57 min. *Subject Headings:* **1. Precipitation streaks 2. Fro tal type precipitation.**—*C.E.P.B.*

5.6–219 551.577.3(

Gregory, S., **A note on the classification of annual rainfall-distribution types.** *Ro Meteorological Society, Quarterly Journal*, 79(342):538–543, Oct. **1953.** 2 figs., 2 tables, 9 r **DWB**—Rainfalls for each year 1901–39 at numerous stations in S. England were classif as: exceptionally wet (above upper quartile), exceptionally dry (below lower quartile by >1 of median), normal (between these two types) and maximum intensity (exceeding up quartile or falling below lower quartile by 20%). Examples of distributions are shown maps, summarized in tables and discussed. *Subject Headings:* **1. Precipitation variati 2. England.**—*C.E.P.B.*

5.6–220 551.577.3:551.513.2:551.

Johnson, D. H. and Daniels, Sylvia, **Rainfall in relation to the jet streams.** *Royal teorological Society, Quarterly Journal*, 80(344):212–217, April **1954. DLC.** Also in: *G Britain. Meteorological Research Committee, M.R.P.*, 803. May 1, **1953.** 4 p. 5 figs., ta refs. Mimeo. **GB-MO**—Rainfall in British Isles was tabulated against position in regar axis, entrance, center and exit of jet streams. Mean per hour: Entrance, left of axis 0.9 r right 1.8 mm; Center, left 2.4, right 2.3; Exit, left 4.6, right, 2.3. Amounts within 50 mi of generally small. The preponderance of rainfall to right of confluence and left of diflue implies mean cross-axis vertical circulations with ascent beneath the right axis and left e and descent beneath left entrance and right exit, in accord with dynamical theory. *Sub Headings:* **1. Precipitation variations 2. Jet stream.**—*C.E.P.B.*

5.6–221 551.577.33 551.582.2

*Paloque, Émile, **Résumé des observations météorologiques faites à l'Observatoire Toulouse de 1932 à 1951 suivi de quelques notes sur la sécheresse des années 1942 à 1** [Resumé of meteorological observations made at Toulouse Observatory, 1932–1951, notes on the drought of 1942–1950.] *Toulouse. Observatoire, Annales*, 21:21–30, 1 tables. Abstracted from detached sheets. **DWB**—Tables containing various arrangem of monthly mean and extreme temperature and precipitation data for Toulouse (1932–1 are presented as a supplement to the data previously presented (*Annales*, v. 11, p. 169, 1 for the period 1839–1931. Discussing the dry period 1942–1950, the author analyzes dry wet springs during the periods 1727–1761 and 1839–1951. The analysis reveals a period of 36 years (18 dry springs alternating with 18 wet ones). The only concurrent period is that of the water level of the Caspian Sea (with large-scale atmospheric motion as a pos common cause). *Subject Headings:* **1. Climate of Toulouse, France 2. Rainfall periodic 3. Toulouse, France.**—*G.T.*

5.6–222 551.577.5

KHromov, S. P., **K voprosu o proiskhozhdenii osadkov Nizhnego Povolzh'ia.** [origin of precipitation in the lower Volga Region.] *Vsesoiuznoe Geograficheskoe Obshch SSSR, Izvestiia*, 85(1):81–84, Jan./Feb. **1953.** 6 refs. **DLC**—Discussion of a paper wri by ZHAKOV (*see item* 4.4–209, April 1953, *MAB*), who according to the author drew inco conclusions from correct data. KHROMOV points out that the continental air masses transformed from maritime air and the primary source of precipitation is the Atlantic

arctic oceans rather than the Caspian Sea and oases in the desert as assumed by ZHAKOV. Evapotranspiration from analyzed irrigated regions may increase the precipitation about 2.5%. *Subject Headings:* 1. **Precipitation sources** 2. **Critical reviews** 3. **Lower Volga region, U.S.S.R.** I. **Zhakov, S. I.**—*A.A.*

5.6–223 551.577.51:551.577.2(494)

*Bider, Max and Thams, J. Chr., **Weitere Undersuchungen der Niederschlagesregistrierungen nord- und südwärts der Alpen.** [Further investigations on the records of rainfall northward and southward of the Alps.] *Schweizerische Naturforschende Gesellschaft, Verhandlungen*, 72–73, **1947.** Abstracted from reprint. **DWB**—South of the Alps (in Switzerland) prolonged rainy periods are much more frequent than they are to the north, as this comparison of records from Basel and Locarno shows. Average duration of precipitation in period 1936–45 was 1.5 hours at Basel and 3.4 hours at Locarno. Amount 1.8 mm against 6.6 mm, annual number of hours with precipitation 1010 against 1044, and annual number of 24 hour rains 4.4 against 4.3 and number of 50 mm rains 0.1 compared with 6.9 at Basel and Locarno. *Subject Headings:* 1. **Rainfall duration** 2. **Orographic effects** 3. **Switzerland.**—*M.R.*

5.6–224 551.577.52:551.556.2

Szilágyi, Tibor, **A mezövédö erdösávok csapadéknövelö hatásának kérdéséröl.** [On the problem of increasing precipitation by means of shelter belts.] *Időjárás*, 57(2):81–89, March/April **1953.** fig. Russian and French summaries p. 81. Discussion p. 86–89. **DLC**—Progress achieved by Soviet scientists in the field of modification of local climate by means of shelter belts is reviewed on the basis of an article by A. R. KONSTANTINOV. Research undertaken in Hungary is also briefly summed up. The paper was delivered at a Hungarian Meteorological Society meeting. It was followed by a discussion in which theoretical and practical aspects of the problem were analyzed by several Hungarian authorities. *Subject Headings:* 1. **Shelter belt effects** 2. **Climate control** 3. **Precipitation.**—*G.T.*

5.6–225 551.577.62:551.578.1(04)

Goudey, Alice E., **The good rain.** New York, **1950.** unpaged. illus. Trade ed. $1.75, Library ed. $2.25. **DWB**—A beautifully illustrated account, for children, of the effects of drought and the subsequent rain, on the life and activities of rural and city dwellers, crops, etc. *Subject Headings:* 1. **Drought damage** 2. **Rainfall effects** 3. **Juvenile literature.** I. **Unwin, Nora S.** *(illus.).*—*M.R.*

RAIN, HAIL AND SNOW

See also: **Estimation of net long wave radiation from snow** (Berger), 5.6–134; **Homogeneous nucleation of supercooled water drops** (McDonald), 5.6–204; **Good rain** (Goudey), 5.6–225; **Optical extinction by rainfall** (Atlas), 5.6–274.

5.6–226 551.578.1:551.507.352:629.13

Rain-trainer. *Flight*, London, 59(2202):393–394, April 6, **1951.** 2 figs. **DLC**—Research in cloud physics pursued by the Commonwealth Scientific and Industrial Research Organization in Australia, under the leadership of DR. E. G. BROWN, is reported to include measurements with air-borne radar. Characteristics of some typical radar echoes are discussed and one echo from heavy rain and one from ice-crystals falling through cloud presented in photos. Installation of equipment carried by the DC-3 used in flights is shown in a schematic drawing. Data on aircraft icing were also obtained during the flight and cloud water content was measured through water collectors. *Subject Headings:* 1. **Rain observation in clouds** 2. **Airplane observations** 3. **Radar precipitation echoes** 4. **Icing of aircraft.**—*G.T.*

5.6–227 551.578.11

Atlas, David and Plank, Vernon G., **Drop-size history during a shower.** *Journal of Meteorology*, 10(4):291–295, Aug. **1953.** 3 figs., table, 8 refs., 2 eqs. **MH-BH**—Five drop-size spectra at 1½–2 min intervals during shower at Watertown, Mass., shown by histograms, indicate a steady decrease of median volume diameter d_o from 1.8 to 0.3 mm. Distribution agrees with computed expression $d_o = 0.92\ R^{0.21}$, except for first drops, but reflectivity is only

half that predicted by $Z=200\ R^{1.6}$ (R, rate of rainfall). Results are interpreted in terms o physical history of raindrops. *Subject Heading:* **1. Raindrop sizes.**—*C.E.P.B.*

5.6–228 551.578.11:551.508.8

Krasnogorskaia, N. V., **Elektronnyĭ umnozhitel' kak pribor dlia izmereniia razmero chastits osadkov.** [Electronic amplifier as an instrument for measuring the size of precip tation particles.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofizicheskaia*, No. 5:86–91, 1952 2 figs., 7 refs., 6 eqs. **DLC**—Photoelectric method for the measurement of the dimension o moving and resting particles tested under laboratory conditions. Sizes of drops can b measured with an accuracy up to 3%, if the accuracy of the heating current is 0.1% and of th amplifier current 0.2%. Relationship between the size of the drop (d) and the impuls amplitude (V) is $V=Ad^2+Bd$. A and B depend on experimental conditions. *Subje Headings:* **1. Raindrop size measurement 2. Electronic amplifiers.**—*A.A.*

5.6–229 551.578.46:551.50

*U. S. Soil Conservation Service, **Summary of snow survey measurements for the Platte Arkansas drainage basins, 1936–1952 inclusive.** Issued by Div. of Irrigation Engineering Soil Conservation Service, Colorado Agricultural Experiment Station and State Engineer o Wyoming, Aug. **1952.** 36 p. mostly tables. Mimeo. **DWB**—Average snow depth an water content of snow given for each course for one date during each month (Feb.–May each year since surveys began (in 1936). Location of each course is given in detail. *Subje Headings:* **1. Snow surveys 2. Snow depth 3. Water content of snow 4. Platte-Arkansa Drainage Basin. I. Colorado Agricultural Experiment Station II. Wyoming. State Engine III. Blehm, Lois D.**—*M.R.*

5.6–230 551.578.46:551.50

*U. S. Soil Conservation Service, **Summary of snow survey measurements for the R Grande drainage basin, 1936–1952 inclusive.** Issued by Division of Irrigation Engineerin Soil Conservation Service, Colorado Agricultural Experiment Station and State of Ne Mexico, July **1952.** 22 p. mostly tables. Mimeo. **DWB**—Summaries of average sno depth and water content measurements. Location of courses given in detail. *Subject Hea ings:* **1. Snow surveys 2. Water content of snow 3. Snow depth 4. Rio Grande Drainag Basin. I. Colorado Agricultural Experiment Station II. New Mexico. State Engine III. Blehm, Lois D.**—*M.R.*

5.6–231 551.578.7:3

*Cullison, James B., Jr., **Crop-hail insurance and crop insurance.** Paper prepared f Fourth Hemispheric Insurance Conference, N. Y., Sept. 7–12, 1952. Chicago, **1952.** 20 tables, photos. **DWB**—After a brief history of hail prevention and hail insurance measur the pamphlet discusses hailstorms and hailstones and the damage caused thereby during ea year from 1913 to 1951, incl. [To use these statistics as an indicator of hail severity the ve strong economic factor must be removed.] The author states that Weather Bureau Agricultural Crop Reports are inadequate for insurance purposes due to sampling erro He also claims that hailstorms occur in cycles of 9 to 11 years. Peak years were 1915, 191 1920, 1923, 1928, 1938, 1944, 1947 and 1951. Low years 1917, 1926, 1934, 1940, 1946 a 1950. *Subject Headings:* **1. Hail insurance 2. Hail damage statistics 3. United States.** *M.R.*

5.6–232 551.578.7:551.594.

Mason, B. J., **On the generation of charge associated with graupel formation in thund storms.** *Royal Meteorological Society, Quarterly Journal*, 79(342):501–509, Oct. **1953.** 3 fig table, 25 refs., 5 eqs. **DWB**—Generation and separation of charge above 0°C level in thund clouds are attributed to growth of graupel pellets. Laboratory experiments show that ri growing in supercooled water droplets receives a negative charge so long as it does not beco wet. Calculations with a cloud model show that accretion of supercooled water on ice nu to form graupel can generate sufficient charge in 10 min to supply 20 lightning flashes fro

arge thunderstorm cell. *Subject Headings:* **1. Graupel 2. Thunderstorm electricity.**—*E.P.B.*

5.6–233 551.578.71

SHishkin, N. S., **Issledovanie rosta sfericheskogo grada.** [Investigation of the growth f spherical hail.] *Akademiia Nauk, SSSR, Izvestiia, Ser. Geofizicheskaia*, No. 6:73–78, **1952.** figs., 4 refs., 9 eqs. **DLC**—Hail is formed as a result of the freezing of cloud droplets when louds ascend and the temperature falls. The method for calculating the growth of droplets s described and the formula used for calculating the growth of large spherical ice particles is:

$$\Delta_i = \frac{1}{4}\frac{\rho_w}{\rho_i}\left(1+\frac{u}{v}\right)q_w\Delta z$$

here ρ_w and ρ_i are the density of water and ice, respectively; v—velocity of fall of ice particles elative to air; q_w—liquid content of cloud. The results of calculations show that large hail tones can be formed at small but continuous velocity of the ascending currents. *Subject Headings:* **1. Hail formation 2. Spherical hail.**—*I.L.D.*

5.6–234 551.578.72:629.135

Hit by hail. *Flying Safety*, Wash., D. C., 9(7):2–6, July **1953.** photos., ref. **DWB**—Photographs show extreme amount of damage to U.S.A.F. planes caused by hail encountered in flight. Stones <1 inch in diameter cause little damage but 1–2 inch stones can cause serious damage to the landing edges and windshields, propellers, etc. unless cruising speed is reduced. Hail usually occurs in very narrow bands in mature thunderstorms, and seldom (<10%) between midnight and noon. They occur more often in spring (April–June 64%) between 14 and 22 h (85%) and in cold front storms (80%) between the Mississippi and Continental Divide (74%). Forecasting hail is difficult since there is great lack in uniformity among thunderclouds with respect to presence or amount of hail. An unstable layer of 15,000 ft depth is usually required. *Subject Headings:* **1. Hail frequency 2. Hail damage to aircraft. F. Souter, R. K. II. Emerson, Joseph B.**—*M.R.*

5.6–235 551.578.72(438)

Molga, Marian, **Mapka czestosci wystepowania opadu gradowego na terenie wojewodztw: gdanskiego, olstynskiego i bialostockiego (okres obs. 1946–1950).** [Map showing the frequency of occurrences of hail precipitation in the territory of Gdansk, Olsztyn and Bialystok provinces (period 1946–1950).] *Gazeta Obserwatora PIHM*, 4(9):6–8, Sept. **1951. DLC**—A map showing graphically the frequency distribution of hailstorms in the 3 northeastern provinces of Poland. The map has been drawn on the basis of 5 years of observation (1946–1950) by a network of hail observation points; there are about 6000 such observation points in Poland. *Subject Headings:* **1. Hailstorm frequencies 2. Poland.**—*A.M.P.*

5.6–236 551.578.73:551.524.7(44)

Houy, J., **Remarques sur une statistique de grêle relative à l'année 1950.** [Remarks on hail statistics in relation to the year 1950.] *La Météorologie*, 4th Ser., No. 26:90–93, April/June **1952.** fig., table. English and Spanish summaries p. 90. **MH-BH**—Hail statistics for 1950 for all of France are analyzed and related to the data on the height of the 0°C from 6 radiosonde stations (Bordeaux, Brest, Lyon, Nîmes, Strasbourg and Trappes). The number of days with hail is compared with the number of days with thunderstorms and tabulated by 500 m class intervals of H_0 (height of 0°C isotherm) from 0 to 5000 m. Difference between hail conditions in mountains and in coastal regions is considered. It is found that the ratio of hail to thunderstorm days increases to 96% with H_0 in the north of France at 500–1000 m and in the S. of France to 81% at 1000–1500 m, and then decreases as the height of the freezing level increases until at 4500–5000 m the incidence of hail becomes 0 for the whole country. *Subject Headings:* **1. Hail frequency 2. Hail-thunderstorm ratio 3. Zero isotherm 4. France.**—*M.R.*

HYDROMETEOROLOGY

See also: **Forecasted temp. and snow melt flood** (Gay), 5.6–76; **Evaporation in Sweden** (Bergsten), 5.6–193; **Evapotranspiration estimates, criteria for time of irrigation** (van Bavel, Wilson), 5.6–198.

5.6–237 551.579(05):551.506.1(79

*California. Dept. of Public Works. Div. of Water Resources, **Water Conditions California.** First issue received Feb. **1940**; latest issue received, March **1, 1953.** numero tables. Mimeo. Monthly Feb. through May. Title has varied: California Cooperati Snow Surveys; Snow Survey Bulletin. **DWB**—Current information with detailed data f precipitation and snowpack water content, storage in reservoirs and runoff of representati streams. Precipitation in percent of normal is given on maps. *Subject Headings:* **1. Precip tation data 2. Snow courses 3. Hydrologic data 4. California.**—*A.A.*

5.6–238 551.579

Ichijima, Hiroshi, **Floods owing to melting snow in the inland parts of the Yamaga Prefecture.** *North-East Japan Researches*, 2(1):22–25, Feb. **1952.** 3 figs., 5 tables. Japanese: English summary, p. 55. **DWB**—The writer has investigated a number of i stances of floods due to melting snow in the inland parts of Yamagata Prefecture. Sno floods in moderate snow years are compared with those in heavy snow years. In the forme the curve of flood levels shows a sharp peak similar to that shown by a typhoon flood, wh the latter have a gradual curve. The rise in atmospheric temperature and rainfall were fou to contribute considerably to the effect of snow melting. Rainfall of 30–40 mm with a dai average temperature of 8°C usually causes a snow flood. Snow floods do not occur even wi a daily temperature of 10°C unless rainfall in the mountain region exceeds 10 mm. A slig warm front and rainfall cause big floods in heavy snow years and big floods follow hea April rainfall even in moderate snow years. *Subject Headings:* **1. Snow melt floods 2. Yam gata Prefecture, Japan.**—*From author's abstract.*

5.6–239 551.579.4:551.577.2(4

Marchi, Enrico, **Die Hochwasserkatastrophe in der Po-Ebene im November 19** [Flood catastrophe on the Po Valley, Nov. 1951.] *Die Wasserwirtschaft*, Stuttgart, 48(8):26 269, **1952.** 3 tables, 5 figs., 2 refs. **DLC**—The maximum runoff during the catastrop flood is compared with the total amount of rainfall from Nov. 7 to 12, 1951. The rainf amount was about 50% higher than before the two previous great floods in 1926 and 19 The average water depth in the flooded region (1065 km²) was 3 m, and in Feb. 19 still 1.5 m. *Subject Headings:* **1. Floods 2. Runoff 3. Rainfall amount 4. Po Valley, Ita** —*A.A.*

5.6–240 551.579.4

Pardé, Maurice, **Sur la genèse et les caractères de plusieurs grandes inondations récent** [The origin and character of some recent very severe floods.] *Annales de Géographie*, Par 62(329):18–36, Jan./Feb. **1953.** 11 figs., table, refs. **DWB**—The author describes primar the hydrological aspects of the following floods: the Garonne and Adour flood, Feb. 19 the lower Rhone floods, Nov. 1951; the Po flood, Nov. 1951; the Oct. 1951 flood, south Italy and the Lynmouth flood, Aug. 1952. Statistical data on water levels obtained dur the various floods are given in tables and graphs and for the Lynmouth a description of mospheric conditions is given. *Subject Headings:* **1. Floods 2. Europe.**—*I.L.D.*

CLIMATOLOGY AND BIOCLIMATOLOGY

CLIMATOLOGY

5.6–241 551.58(775):581.

Lindsay, Douglas R. (*Cent. Exp. Farm, Ottawa*), **Climate as a factor influencing the m ranges of weeds.** *Ecology*, New York, 34(2):308–321, April **1953.** 8 figs., 12 refs. **DWB** Maps showing the regional distribution of various species of weeds in Wisconsin are present

n the basis of a survey of Wisconsin climate (including a study of mean daily July evaporation) is shown that there exists a definite correlation between the regional distribution of climatic ıctors and certain weeds. This is confirmed by the appearance of the same species in various arts of the North American Continent having similar climates. It is suggested that weed anges may be predicted on the basis of climatic data. *Subject Headings:* **1. Plant ecology . Climatic influences 3. Wisconsin.**—*G.T.*

5.6–242 551.58:92

Sapozhnikova, S. A. and Grigor'eva, A. G., **Trudy osnovopolozhnika sovremennoĭ klima-ɔlogii.** [Works of the originator of modern climatology.] *Priroda*, Moscow, No. 6:117–120, une **1953. DLC**—This is a review of the newly completed edition in 3 volumes of VOEĬKOV's elected works published by the Institute of Geography of the Academy of Sciences. After iving a brief summary on the life and scientific activity of the founder of modern climatology he reviewers list and comment on the contents of each volume. They include, besides his nonograph "Climates of the world," 2 papers on the influence of snow cover on climate, one aper on atmospheric circulation and 39 articles on the main topics: genesis of weather and limate; changes of climatic conditions in the geological past and water regime and climate. Two articles by PROF. RIKHTER, "A. I. VOEĬKOV's works," a complete bibliography and "Life nd activity of Voeikov" as well as PROF. GRIGOR'EV's "Voeĭkov's guiding climatological deas" complete the edition. *Subject Headings:* **1. Climatology 2. Biography 3. Reviews . Voeĭkov, Alexandr Ivanovich.**—*A.M.P.*

CLIMATE OF PARTICULAR PLACES

See also: **Climatic normals and quintile groups of precip., Far East** (Japan. Central Met. Obs.), 5.6–48; **Wind distribution in Hiroshima** (Iida), 5.6–168; **Saturation deficit of atmos., U.S.S.R.** (Sokolova), 5.6–192; **Met. observations 1932–51 and drought 1942–50, Toulouse** (Paloque), 5.6–221.

5.6–243 551.582(826) 551.5:551.311.12

Lliboutry, Louis, **Snow and ice in the Monte Fitz Roy region (Patagonia).** *Journal of Glaciology*, 2(14):255–261, Nov. **1953.** 8 figs., 4 refs. English and French summaries p. 255. **DLC**—The region, on margin of Patagonian icefield, has continuous strong humid west winds. Glaciers descend to very low levels. Ablation by rain is important and causes irregular surface features. Deposits of glaze and rime are heavy. A section is devoted to the climates of the district. *Subject Headings:* **1. Climate of Patagonia 2. Glaciers 3. Fitz Roy Region, Patagonia.**—*C.E.P.B.*

5.6–244 551.582(494)

*Mercanton, Paul Louis, **Climatologie Lausannoise.** [Climatology of Lausanne.] *Société Vaudoise des Sciences Naturelles, Lausanne, Bulletin*, 65(282):331–340, **1952.** 3 tables. **DWB**—This contribution to the local climatology of Lausanne contains four independent notes. The first note discusses a statistical method for determining monthly mean temperature from the median value of monthly maximum and minimum temperature. The second compares extreme temperature at Ouchy (396 m) with those at Champ de l'Air (553 m). The third discusses humidity values at Ouchy (near Lake Leman) and Champ de l'Air, and concludes that proximity of the lake does not considerably affect humidity values. The fourth note deals with local variations of rainfall amounts. *Subject Headings:* **1. Local climatology 2. Climate of Lausanne 3. Lausanne, Switzerland.**—*G.T.*

5.6–245 551.582:656.7(747) 551.589.5(747)

*Peterson, Erving N., **Selected ceiling-visibility-wind relationships at LaGuardia Field, New York City.** Trans World Airlines, Meteorology Dept., [**1953?**] 32 p. 20 figs., 11 tables, 4 refs. Mimeo. **DWB**—Elaborate statistics are presented and analyzed (tables and wind roses) to show the frequency of winds, ceilings and visibility (1939–1948 data) in various categories at LaGuardia Field, N. Y. Statistics for each parameter separately and in combination (low ceiling vs. wind direction, etc.) are presented. Finally, the incidence of combined low ceilings and low visibility is related to wind direction (16 points) and speed and

presented in tables and "Scalia" type wind roses for 3 different degrees of poor flying weather. A summary of the local influences is accompanied by a short showing local topographic sources of smoke, etc. *Subject Headings:* 1. Ceiling-visibility-wind data 2. Airport climatic data 3. LaGuardia Field, N. Y.—*M. K.*

5.6–246 551.582

Vandeveldes, A., Le climat de la Nouvelle Zélande. [New Zealand weather and climate.] *Ciel et Terre*, 68 (9/10): 213–234. Sept/Oct. 1952. MH-BSI. Review of a 36-page collection of articles and bibliographic and statistical material published under the above English title by the N. Z. Geographical Society in 1950 (*see item 5.6–155, June 1952, M.W.R.*). Contents of the publications are summarized and general features of the climate of New Zealand discussed. *Subject Headings:* 1. Climate of New Zealand 2. Reviews 3. New Zealand.—*J. T.*

5.6–247 551.582.2

Howell, Wallace E. (Harvard Univ.) El tiempo local en el Valle del Chicama. [Local weather in Chicama Valley.] *Tiempo*, 5 (1/2): 11–25. July/Dec. 1952. 4 figs. [Translated from original English manuscript expressly for publication in *Tiempo*.] DWB—Discussion of topography of the Chicama Valley in Peru and its effect on the trade wind airflow, land-sea breeze, lower level and local convective regime of the weather in this region are discussed. Two typical report days (Feb. 20 and 26, 1952) and one dry day (Feb. 25, 1952) are analyzed as to wind, precipitation and circulation characteristics. The typical coastal and typical valley regions are then treated and a model of afternoon circulation and cloud system over the two areas presented and discussed, with emphasis on diurnal and orographic factors. *Subject Headings:* 1. Local climates 2. Cloudiness regime 3. Orographic effects 4. Chicama Valley, Peru.—*M. K.*

5.6–248 551.582.1 551.577.2

Portig, Paula and Howell, Wallace E. Some aspects of the Peruvian rainfall climate. Cambridge, Mass., Wallace E. Howell Assoc., Oct. 1952. 15 p., 10 figs., 6 tables, bibl. DWB—Work prepared as a climatic base for flood seeding operations. Mean rainfall values, frequency data of daily rainfall intensity and rainfall variability data presented for Cerro de Pasco and Chicama-Moche catchment areas (period 1944–50). Relationship between rainfall and large scale weather pattern studied, distinguishing eight weather types and giving typical accompanying sea level pressure maps. Frequency and mean daily precipitation values computed for all types (1940–1951). Frequency of different inversion heights given together with associated rainfall amounts but significant relationship. Good correlation between mean temperature lapse rate and precipitation. *Subject Headings:* 1. Climate of Peru 2. Rainfall 3. Weather types 4. Peru. I. Howell, Wallace E., Associates, Inc., Cambridge, Mass.—*M. K.*

5.6–249 551.582

*Hess, F. Norwin. The climate of the American Northlands. (*In* Encyclopedia Arctica, Vol. 7, Meteorology and Oceanography. [Typewritten ms. submitted June 1951. Pp. 3.] 71 tables, bibliog. p. [37–38].) DWB—The Arctic is defined as the area north of the northern limit of tree growth, or the 10°C (50°F) isotherm for the warmest month. The sub-Arctic is defined as the area between that line and the southern limit of permafrost, or the area where tree growth is possible but successful agriculture (as distinct from gardening) cannot be practiced. Both areas are not precisely delimited but the approximate limits in North America are shown on a chart. The dynamic climatology of the Bergeron school is emphasized in this encyclopedia article. Air masses and fronts and associated temperature, precipitation, winds, humidity and cloudiness, together with frequencies and mean values of each are presented with an interpretation which ties all of these elements together and links them to the general physical and human (including plant and animal) geography of the Canadian Arctic. *Subject Headings:* 1. Climate of Canadian Arctic 2. Canada 3. Greenland.—*M. K.*

5.6–250 551.582.2

*Kosiba, Aleksander (ed.). Klimat Wrocławia w okresie pięciolecia 1946–1950. [Climate de Wrocław dans la période 1946–50. [Climate at Wrocław, 1946–50.]

Quaternarium Meteorologii i Klimatologii. Prace No. 5:49–52, 1952. tables. In Polish; legends & summary (p. 6), in French. DWB—Author presents monthly means, average maxima & minima, mean arithmetic and standard deviation and variability from year to year for mean temperature, precipitation, sunshine duration, cloudiness, wind velocity, vapor pressure and relative humidity. Deviations from the period 1881–1930 are given, but deviation and variability values are based only on the five-year period. *Subject Headings:* 1. Climatic data 2. Climatic variability 3. Climate of Wrocław, Poland 4. Wrocław, Poland.—*E.P.B.*

CLIMATIC CHANGES

See also: Climate, 5.6-4; Changes in geographic distribution of Finnish birds and mammals . . . (Kalela), 5.6–265.

5.6–251 551.583.3:581.9(471.1)

Hackel, Leo. Die spätglaziale Entwicklung der Vegetation und des Klimas in Finnland. [Late glacial development of vegetation and climate in Finland.] *Geologische Rundschau.* Stuttgart. 34/3 & 4:695–704, Sept. 10, 1952. fig., 43 refs. DLC—During Baltic Ice Lake time, S.E. Finland was mainly ice free but formed a cliff-bounded exclave in the ice lake. Tundra vegetation prevailed with unimportant tree stands in favorable places at the end. Gulf Allerød interstadial comes near end of this period. Yoldia-Ancylus period was still cool & more genial during it Finland became ice-free and E. Finland forested. Towards end Ancylus (Yoldia IV) birch-pine over nearly all Finland. Ice age ended in Litorina period and has spread quickly. This is attributed to unhindered effect of Gulf Stream. vegetation zones N–S. *Subject Headings:* 1. Quaternary climates 2. Forest succession 3. Finland.—*E.P.B.*

5.6–252 551.583.3:529

Antevs, Ernest. Geochronology of the deglacial and neothermal ages. *Journal of Geology.* 59:195–230, May 1953. 4 figs., tables, 133 refs. DLC—This well documented revision of time dating of glacial retreat stages of Fennoscandia and North America dates the marked temperature rise which initiated the "Neothermal" period as 10,150 before 1950 A.D. in Finland & estimates the Springfield retreat in North America as 25,000 years ago. The radio-carbon timing gives too short a period for post-glacial in N. America and possible errors of radio-carbon dating are discussed. *Subject Headings:* 1. Geochronology 2. Glacial periods Radiocarbon dating.—*C.E.P.B.*

5.6–253 551.583.3

Beck-Mannagetta, Peter. Die eiszeitliche Vergletscherung der Koralpe (Alpen-Ostrand). [The glaciation of the Koralp (Austria, Eastern Alps.)] *Zeitschrift für Gletscherkunde und Glazialgeologie.* 2/2:263–277, 1953. 2 charts, 16 refs. English summary p. 275–276. MH—The Würm glaciation here is divided into four stages with snow lines, respectively, 1700, 1600, 1920 and 1300 m. *Subject Headings:* 1. Quaternary climates 2. Austrian Alps.—*E.P.B.*

5.6–254 551.583.3:551.481(969)

Gross, H., Die erste pollenanalytische Vegetationsgeschichte aus den Tropen. [The first pollen-analysis from the tropics.] *Naturwissenschaftliche Rundschau.* 6/9:378–379, Sept. 1953. DWB—Summary of memoirs on post-glacial peat and climatic changes in Hawaii. Three periods found: Pre- and early warm period; culmination of post-glacial warm period; rather sudden change to post-warm period, rainier than now. *Subject Headings:* 1. Quaternary climates 2. Bogs 3. Hawaii.—*C.E.P.B.*

5.6–255 551.583.3

Schneider, Hans-Jochen. Quartäre Seeabsätze und spätglaziale Gletscherstände im Unter-Leutasch-Tal (Nordtiroler Kalkalpen). [Quaternary lake deposits and late Glacial glacier positions in the Unterleutasch Valley (North Tyrolean Dolomites.)] *Zeitschrift für Gletscherkunde und Glazialgeologie.* 2/2:241–261, 1953. 5 figs., table, 18 refs. English

summary p. 259–260. **MH-BH**—Fossiliferous calcareous deposits between moraines a detrital deposits show a warm climate before Würm glaciation and again at base of L Glacial below end moraines. This contains Quercus and Picea and resembles similar depos formed late in Postglacial Atlantic period. *Subject Headings:* **1. Quaternary clima 2. Unterleutasch Valley, Austria.**—*C.E.P.B.*

5.6–256 551.583.7:52

Fleckenstein, J. O., **Erdkreisel der Geophysik und Fundamental-system der Astronom** [The geophysical earth-top and the fundamental system of astronomy.] *Experientia*, Bas 9(12):437–457, Dec. 15, **1953.** 25 figs., 6 tables, refs., eqs. English summary p. 457. **DWB** This study sets out the theory of the earth's rotation with special reference to movements the poles and the work of the International Latitude Service. The consequences of the p movements deduced by MILANKOVITCH in geological changes of climate accord well w WEGENER's conclusions from geological evidence. Pt. 2 discusses the annual and secu changes of the speed of rotation and their effects on the measurement of time. The work the International Time Service, and the geophysical effects, are described. *Subject Headin* **1. Polar migration 2. Geological climates.**—*C.E.P.B.*

MICROCLIMATOLOGY

See also: **Air pollution problem in Los Angeles** (Haagen-Smit), 5.6–95; **Distribution of shelter belts on collective and state farms** (Gorshenin), 5.6–177; **Climatic effect of shelter belts** (Luncz), 5.6–184.

5.6–257 551.584.61:62

Holleman, Theo. R. (*Texas Eng. Ex. Stat.*), **Air flow through conventional window op ings.** *Texas. Agricultural and Mechanical College. Engineering Experiment Station, search Report*, No. 33, Nov. **1951.** 45 p. illus., 5 refs. **DWB**—The author distinguis between winter ventilation, when an upward flow ventilating the room is desirable, and summer ventilation, when the air flow should be directed on the inhabitants. He uses a smoke from titanium tetrachloride to make the air flow visible. An experimental build and air flow chamber with window models served for the tests of the main conventional wind openings. With "hung" openings the air flow can be directed in different desirable leve with vertical vane openings, a broad distribution of air flow can be reached. Jalousie windo make it possible to direct the air flow not only upwards but also downwards. Numer sketches accompany the paper. *Subject Headings:* **1. Indoor climates 2. Heating and v tilating.**—*A.A.*

5.6–258 551.584

Metzler, Karl, **Raumklimatische Messungen und der Einfluss vom Wetter und Kli auf den arbeitenden Menschen.** [Indoor climatic measurements and the influence of weat and climate on working men.] *Annalen der Meteorologie*, 5(7/12):236–241, **1952.** 6 f Discussion p. 240–241. **MH-BH**—Comfort boundary or sultriness limit is taken as va pressure of 14.08 mm. Hourly means of temperature, R.H. and V.P. in two Oldenb schools in Aug. and Sept. are shown; sultry conditions prevailed for part of day in occup S and W rooms but not in E or unoccupied rooms. Design of new schools and best us existing ones is discussed. *Subject Headings:* **1. Indoor climates 2. Sultriness 3. Oldenbu Germany.**—*C.E.P.B.*

5.6–259 551.584

Metzler, Karl, **Raumklimatische Vergleiche von Ost- und Weträumen und der Einfl des Raumklimas auf Arbeit und Leistung.** [Comparison of climate of east and west rooms a influence of room climate on work and output.] *Angewandte Meteorologie*, 1(11):342–3 Nov. **1953.** 8 figs., 9 refs. **MH-BH**—Similar rooms on E and W sides of a new schoo Oldenburg were compared, Aug. 3–Sept. 26. Diurnal variation of temperature of W r 17.3–21.8°C, max. 15 h, in E room 17.7–20.8°C, max. 10–13 h remaining high until 17

creen 12.5–20.5°C, max. 15 h. R.H. nearly constant at 70–75% in E room; in W it ranged rom 90% at 7 h to 75% at 14–17 h. Vapor pressure was higher in W room throughout the ay and above sultriness limit (14.08 mm) 7–21 h (but not on Sundays, when room was unccupied). Variations are compared on overcast, cloudless, hot and cool days. Bearing on chool construction and usage discussed. *Subject Headings:* **1. Indoor climates 2. Oldenburg, Germany.**—*C.E.P.B.*

CLIMATIC CLASSIFICATION

See also: **Evaporation and transpiration, Ireland** (Guerrini), 5.6–194.

5.6–260 551.585.53

Lockspeiser, Sir Ben (*British Dept. of Sc. and Ind. Res.*), **The strategy of desert science.** *Impact of Science on Society*, Paris, 3(3):181–186, Autumn, **1952.** **DWB**—An address delivered at the International Council on Desert Research organized by the Research Council at Israel in cooperation with UNESCO on May 14, 1952 at Haifa. The activities of UNESCO in the promotion of arid zone research, the organizational approval needed to undertake arid zone research, the importance of studying the water supply for deserts with particular reference to cloud seeding as illustrated by the work of E. G. Bowen in Australia and the desalting of brackish water are discussed. *Subject Headings:* **1. Arid zone research 2. Water supply 3. Artificial precipitation 4. UNESCO.**—*I.L.D.*

BIOCLIMATOLOGY

5.6–261 551.586:551.43

Mörikofer, Walter (*Phys.-Met. Obs., Davos, Switzerland*), **Kennzeichen und Beurteilung des Hochgebirgsklimas.** [Characteristics and evaluation of mountain climate.] *Die Medizinische*, Stuttgart, No. 19, May 9, **1953.** 11 p. Abstracted from reprint. **DWB**—Physiologically effective elements of mountain climates are grouped into: a) stimulating factors (larger amount of solar, especially of ultraviolet, radiation; lower pressure and atmospheric density; low humidity; possible effect of chemical composition of the air) and b) protective factors. The former are invariably linked with high elevation while the latter (such as moderate temperature variations, low values of wind, cloudiness, fog, etc.) may be found only in special locations. It is these variable factors which should be investigated when a site is chosen as a health resort. *Subject Headings:* **1. Mountain climates 2. Mountain resort sites 3. Altitudinal influences.**—*G.T.*

5.6–262 551.586:576.8

Kiss, István, **A növényi mikroszervezetek idöérzékenysége.** [Weather sensitivity of plant microorganisms.] *Időjárás*, 57(3):137–144, May/June **1953.** 3 figs., 5 refs. Russian and French summaries p. 137. **DLC**—Two cases of sudden mass propagation of aquatic microorganisms in Hungary are investigated. The author finds a close correlation between these phenomena and periods of cyclonic depression. He believes that the correlation can be traced back to the activity of biocatalytic agents. The meteorological factors involved can not be identified as yet. *Subject Headings:* **1. Weather sensitivity 2. Atmospheric pressure effects 3. Microorganisms.**—*Trans. of author's abstract.*

5.6–263 551.586:581.0

Vegis, A., **The significance of temperature and the daily light-dark period in the formation of resting buds.** *Experientia*, 9(12):462–463, Dec. 15, **1953.** 7 refs. French summary p. 463. **DWB**—Resting buds of *Hydrocharis morsus ranae* (frogbit) form at temperatures above 10–15°C, the critical temperature being higher the longer the daily period of light. *Subject Headings:* **1. Bioclimatic research 2. Plant development.**—*C.E.P.B.*

5.6–264 551.586:581:056

Van der Paauw, F., **Aanpassing en schade van het gewas haver bij watergebrek.** [Damage to oats caused by drought and adaptation to low water conditions.] (In: Nederlandse

Centrale Organisatie voor Toegepast-Natuurwetenschappelik Onderzoek. Commisie vo Hydrologischen Onderzoek, **Verslagen Technische Bijeenkomsten, 1–6, 1946–1950.** 'S-Grave hage, **1952.** p. 202–205. 4 figs. In Dutch; English summa p. 324–325.) **DWB**—A short but valuable paper. Actual experiments made on the effe of drought periods on yield. Most dangerous is drought during emergence of panicle a flowering. Production of matter on comparatively dry soil can be even better than on constantly moist soil. Graphical data presented on relationship between transpiration, te perature (considerable influence) and relative humidity (small effect). Light intensity a wind speed have only a slight effect. *Subject Headings:* **1. Drought effects 2. Agricultu climatology 3. Oats 4. Transpiration.**—*A.A.*

5.6–265 551.586:59:551.5

Kalela, Olavi (*Zoological Museum, Helsinki*), **Changes in the geographic distribution Finnish birds and mammals in relation to recent changes in climate.** *Fennia*, Helsinki, N 75:38–51, **1952.** 3 figs., refs. **DWB**—Since the end of the last century several mamm and birds have spread northward and other species have declined at their southern limit Finland. The distinct changes in the distribution are attributed to milder winters and warm springs. Many of the southern newcomers are greatly reduced again due to recent seve winters. Some desert species have advanced. *Subject Headings:* **1. Ecoclimatology 2. An mal ecology 3. Birds 4. Mammals 5. Climatic variations 6. Finland.**—*A.A.*

5.6–266 551.586:59:523

Weyer, Edward M., Jr., **Daylight and darkness in high latitudes.** (In: **Encyclope Arctica, Vol. 7, Meteorology and Oceanography,** unpub. ms., photostat, July **1951.** Pt. 9 figs.) **DWB**—The period of daylight (sunlight and twilight) at different latitudes in t Arctic is discussed and shown quantitatively on nomograms. The effect of sunlight a daylight on humans and animals is treated and the influences of moonlight, atmosphe refraction, effect of altitude, cloudiness, water bodies, etc. mentioned in respect to their i portance for human activities. Psychological factors produced by darkness or contin daylight are not neglected. *Subject Headings:* **1. Daylight duration 2. Twilight durati 3. Physiological climatology 4. Arctic.**—*M.R.*

5.6–267 551.586:591.044:595.75

Unger, K. and Müller, H. J., **Studien über die Bedeutung von Witterung und Mikrokli für den Massenwechsel der Schwarzen Bohnenlaus (*Doralis fabae* Scop).** [Studies on importance of weather and microclimate for the metamorphosis of the bean blackfly.] *Am wandte Meteorologie*, 1(9):257–275, Feb. **1953.** 17 figs., 3 tables, 16 refs. **DWB**—Go agreement was found in 1949–52 between the accumulated temperature at Quedlinburg af the blooming of the snowdrop and the main phase of metamorphosis of the black fly in spr and early summer, giving a basis for forecasting. The flying phase begins when the l temperature reaches 17°C. The influence of summer weather on flight is examined, show the effect of limiting factors (light, wind, rain) and favorable ones (temperature, humidit Practical conclusions for plant protection are listed. *Subject Headings:* **1. Bioclimatol 2. Insect forecasting.**—*C.E.P.B.*

5.6–268 551.586:

Hentschel, G., **Die endogenen und exogenen Anteile des "Empfindungsklimas."** [edogenous and exogenous parts of sensible climate.] *Angewandte Meteorologie*, 1(11):321–3 Nov. **1953.** 10 figs., table, 18 refs. **MH-BH**—Relations of sensible temperature to cool power by katathermometer or frigorimeter, given by different authors, vary greatly, ow to complex physiological factors. Observations with 114 persons on 16 point scale (unbeara hot to unbearably cold) are analyzed according to sex and age, time of day and season, a according to temperature, wind force, state of ground and cloudiness. Results are shown diagrams and tabulated. Increased sensitivity to external cold was found in youths a elderly persons, and a decrease in afternoon (less marked in women). The external fac

fered from those affecting cooling power, wind strength and humidity proving relatively important. A "sensible" climatology is required. *Subject Headings:* **1. Cooling power Comfort zones.**—*C.E.P.B.*

ENVIRONMENTAL INFLUENCES

See also: **Fog in relation to fog preventing forest** (Hokkaido Univ., Japan), 5.6–207.

5.6–269 551.588.2

Gensler, G. A., **Die Wechselwirkungen zwischen Albula- und Berninakette als Wetterheiden bei Nordstau.** [Interaction between Albula- and Bernina chain as a weather dividing e during northern orographic upslope.] *Wetter und Leben*, 5(1/2):5–6, March **1953. MH-H**—Pure northern orographic upslope is defined as a situation characterized by the absence fronts, by the piling up of cloudy air masses along the northern Alpine slopes and by the nultaneous presence of clear weather in the south. The most striking characteristic of this pe of weather is the upper boundary of the clouds and the direction and velocity of the air w which are determined by the position of Engadin and which determine the types of northn orographic upslope weather. *Subject Headings:* **1. Upslope weather 2. Orographic fects 3. Austria.**—*I.L.D.*

5.6–270 551.588.7:06

Ioganson, V. E. and Fel'dman, IA. I., **Soveshchanie po klimatologicheskim i geofizicheskim sledovaniiam v Prikaspii.** [Conference on climatological and geophysical investigations in e Caspian region.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geograficheskaia*, No. 2:81–85, 952. **DLC**—This is an account of the conference called by the Institute of Geography of the cademy of Sciences and the Complex Expedition on questions of forest belt afforestation. t was attended by representatives of organizations and institutions occupied with investigaions and projects concerning reclamation in the Southeastern part of European U.S.S.R. t includes a list of papers read at the conference, the names of their authors and a summarization of their content. Papers were: 1) To what extent have we mastered the problem of ry winds (sukhovei) by G. N. Vitvitskiĭ; 2) Results of investigations of aerosynoptic conditions of dry wind (sukhovei) formation by B. L. Dzerdzeevskiĭ; 3) Investigations of the requency of days with dry wind arid weather in Middle Asia and the Caspian depression y IA. I. Fel'dman; 4) Results of investigations of evaporability in the Caspian region by . E. Ioganson; 5) Variations of temperature and humidity gradients at .2 and 1.5 meter eight in various conditions of weather; 6) E. V. Isherskaia and M. E. Liakhov, Results f microclimatic observations in Volga valley; 7) O. A. Drozdov, Anticipated changes of he water economy and precipitation conditions in the south and southwest part of European .S.S.R. after completion of amelioration measures; 8) A. M. Obukhov, A review of the work ccomplished at the Geophysical Institute during 1948–1949. *Subject Headings:* **1. Climatic melioration 2. Conferences 3. European U.S.S.R.**—*A.M.P.*

AIR MASS CLIMATOLOGY

See also: **Selected ceiling-visibility-wind relationships** (Peterson), 5.6–245; **Wind direction and speed as related to ceiling and visibility** (Farthing), 5.6–276.

5.6–271 551.589.5

Roy, A. K., **Study of air mass characteristics over India and use of upper air data.** *National Institute of Sciences of India, Delhi, Proceedings*, 15(7):301–305, Sept./Oct. **1949.** fig., ref. Abstracted from reprint. **DWB**—The author outlines his principles of air mass classification for India, as published previously (*India. Meteorological Department, Technical Note*, No. 16, 1946). Characteristic (O_s, W) curves are shown which present the saturation potential temperature versus humidity mixing ratio. The typical weather conditions for each air mass are described. *Subject Headings:* **1. Air masses 2. India.**—*A.A.*

MISCELLANEOUS APPLICATIONS

SOLAR INFLUENCES

See also: **Dependence of large-scale weather on solar phenomena** (Baur), 5.6–73; **Severe winter ahead** (Gillette), 5.6–77; **Atmos. circulation fluctuations in vicinity of S. America; relation to sunspots** (Ramamurti), 5.6–118.

5.6–272 551.590.21 523

Berkes, Zoltán, **A napfoltok és az időjárás.** [Sunspots and weather.] *Természet Technika*, Budapest, 111(7):444–445, July **1952. DLC**—Circulation over Europe in spring of 1952 is interpreted as a function of sunspot activity. A cold air invasion from took place in conjunction with a decrease in sunspot activity, while southwesterly wi brought warm air when the number of sunspots increased. The entire circulation, the aut explains, originates in the temperature difference between equatorial and polar air. T temperature difference is caused by solar radiation and is affected by changes in the radiat received. Sunspots are approximate indicators of such changes. Quantitative values of radiation balance could only be obtained by systematic radiation measurements in the up atmosphere. It would also be necessary to obtain values of outgoing radiation (these depe among other factors, on the amount of cloudiness). *Subject Heading:* **1. Sunspot effects weather.**—*G.T.*

5.6–273 551.590.21:52.

Bochet, R., **Le grand groupe de taches solaires du 9 au 22 mai 1951 et le temps corresp dant en diverses régions.** [The large group of sunspots of May 9 and 22, 1951 and accompa ing weather in different regions.] *La Météorologie*, 4th Ser., No. 28:167–168, Oct./Dec. 1 French, English and Spanish summaries p. 167. **DWB**—An attempt to link unusual weat in France, Spain, Algeria and the West Indies with an important sunspot group which cro the solar disk from May 9 to 22, 1951. *Subject Heading:* **1. Sunspot effects on weather.**—*M*

VISIBILITY

See also: **Difference in visibility between week-day and Sunday near industrial area** (Ratcliffe), 5.6–98; **Momentum spectrum and positive excess of cosmic ray mesons at sea level** (Caro, others), 5.6–138.

5.6–274 551.591:551.57

Atlas, David, **Optical extinction by rainfall.** *Journal of Meteorology*, 10(6):486– Dec. **1953.** 2 tables, 10 refs., 15 eqs. **MH-BH**—Visibility V and optical-extinction coeffic σ due to rain are related to liquid water content by expressions involving a dimensio coefficient $K(n)$. From various data $K(n)$ varies from 0.98 to 1.15. Various interrelat are discussed; especially a consistent relation between σ and rate of rainfall R is found Bergeron type rainfall, σ approx. 0.25 $R^{0.63}$, giving visibility 11.6 $R^{-0.63}$, compared warm orographic rain 2.4 $R^{-0.33}$. *Subject Heading:* **1. Visibility in rain.**—*C.E.P.B.*

5.6–275 551.591:629.13

*Moakler, J. J., **Summary of low ceiling and low visibility combinations at North Airport.** *Canada. Meteorological Div., Cir-2235*, Tec-139, Jan. 21, **1953**; *Local Forecast St* No. 20, Toronto District. 3 p. graphs, tables. **DWB**—Three and a half miles from no east shore of Lake Nipissing, Ontario, lat. 46°22′N, long. 79°26′W, elev. 1210 ft., hourly on conditions below VFR (visual flight regulations) and IFR (instrument flight) are s marized by months for each hour of the day for the 7 years, 1945–1951, and presente tables and graphs for North Bay, Ontario. *Subject Headings:* **1. Ceiling and visibility 2. Local forecast studies 3. Contact flying weather 4. North Bay, Ontario.**—*M.R.*

5.6–276 551.591.3(77):551.553.6 551.5

*Farthing, E. D., **An analysis of wind direction and speed as related to ceiling and visib at Cleveland, Ohio.** Trans. World Airlines, Inc., [1951?] 16 p. 7 tables, 11 figs., 3

limeo. **DWB**—A nice statistical study of frequency of winds of various directions and heeds, frequency of bad, poor and fair ceiling and visibility with different wind directions, nd of the same ceiling and visibility categories with specified wind direction and speed at leveland, Ohio, Airport. Data are presented in the form of detailed wind roses (plain and laillie type) and in extensive tables. A total of 92,034 hourly observations made between un. 1934 and Dec. 1941 and Jan. 1948–June 1950 were included. No seasonal breakdown is ttempted. Data are applied to recommendations for extension of runways, as well as to perations at that airport. *Subject Headings:* **1. Ceiling and visibility data 2. Wind velocity Aeronautical meteorology 4. Cleveland, Ohio. I. Trans World Airlines, Inc.**—*M.R.*

OPTICAL PHENOMENA

5.6–277 551.593.63

*Balk, J. G., **Rare parhelion seen at Oxford, and note on the frequency of solar and lunar alos and associated optical phenomena, 1882–1951.** *Meteorological Magazine*, London, 1(963):263–266, Sept. **1952.** 3 tables. **DWB**—Describes a parhelion to solar halo of 8° adius on Jan. 20, 1952. Monthly frequencies of solar and lunar halos and annual frequencies f all types of optical phenomena are tabulated and compared with Montsouris, Paris. *Subject Heading:* **1. Halo observations.**—*C.E.P.B.*

5.6–278 551.593.653(09)

Read, R. S., **Mother-of-pearl clouds.** *Weather*, 8(4):127, April **1953. MH-BH**—Account f luminous clouds quoted from: "An historical and philosophical account of the barometer r weatherglass," by Edward Saul, 1730. Heights estimated as up to 69 miles. *Subject Headings:* **1. Nocturnal clouds. I. Saul, Edward.**—*C.E.P.B.*

5.6–279 551.593.7

Alvarez Castrillón y Bustello, Manuel, **Polarización de la luz del cielo en Barcelona, II. osición del plano de polarización.** [Polarization of sky light in Barcelona, Pt. II. Position f the plane of polarization.] *Revista de Geofísica*, Madrid, 11(43):272–298, July/Sept. **1952.** 5 figs., tables. In Spanish; English summary p. 273. **DWB**—Using observations made from tower at the Univ. of Barcelona with a Savart polariscope, an elaborate analysis is made of he position of the plane of polarization of sky light with a clear, cloudy, and with various ypes of clouds (ACu, Ci, CiCu, Ci-St, Ci filosis, Cu, Fr-Cu) and cloud amounts. The angle nade by the plane of polarization and the vertical is smaller if the point is above the sea than t is if it is over the land, and when the sun is over the sea than over the land. When it is loudy the angle is larger than when it is clear, as a rule. The position of Babinet, Arago and Brewster neutral points are also analyzed. Numerous graphs and charts show regularity or ssymetry due to various causes, especially due to the sea. *Subject Headings:* **1. Sky light olarization 2. Neutral points 3. Cloud effects on polarization.**—*M.R.*

5.6–280 551.593.7

Valniček, Boris, **Enregistrement des variations de polarisation de la lumière diffuse du iel diurne.** [Recording of variations of diffuse day light sky polarization.] *Bulletin of the Central Astronomical Institute of Czechoslovakia*, Prague, 2(11/12):185–186, Dec. 31, **1951.** 3 figs., eqs. **DLC**—Discussion of principal formulas and short description of an apparatus used. *Subject Heading:* **1. Sky light polarization.**—*A.A.*

5.6–281 551.593.9

Maier, Wilhelm, **Sonnendoppelschatten und Erdblink.** [Double sun shadow and earth-shine.] *Meteorologische Rundschau*, 6(3/4):62–64, March/April **1953.** fig., 4 refs. **MH-BH**—Double sun shadows (*see items* 9–153 and 2.5–196, Sept. 1950, May 1951, *MAB*) were nvestigated experimentally. The yellow shadow appears 15 min before the double shadow, and is due to earth-shine. *Subject Headings:* **1. Optical phenomena 2. Earth shine.**—*C.E.P.B.*

ELECTRICAL PHENOMENA

See also: **Scattering of 56-Mc/s radio waves from lower ionosphere** (Forsyth, others), 5.6–105; **Wave solutions . . . for particular E-region model** (Gibbons, Nertney), 5.6–106; **Double refraction in ionosphere** (Larenz), 5.6–107; **Synopsis of ionospheric cross modulation** (Huxley), 5.6–108; **Charge generation associated with graupel formation in thunderstorms** (Mason), 5.6–232.

5.6–282 551.594.22:634.

Bäume beim Gewitter. [Trees in thunderstorms.] *Naturwissenschaftliche Rundscha* 6(9):379–380, Sept. **1953. DWB**—Recently 6 men sheltering under poplar were struck lightning. Risks under different trees are assessed and causes of differences discussed. *Subj Headings:* **1. Lightning danger 2. Forests.**—*C.E.P.B.*

5.6–283 551.594.7:621.3

Anderson, L. J. and Gossard, E. E., **Oceanic duct and its effect on microwave propagati** *Nature*, London, 172(4372):298–300, Aug. 15, **1953.** 4 figs., 4 refs., eqs. **DWB**—A criteri for trapping in a surface duct is derived in terms of index of refraction at level at which m teorological observations are taken and at sea surface, profile index of potential refract index, and surface roughness. This is checked against field strength observations over Can gan Bay with fairly good results. *Subject Heading:* **1. Radio transmission ducts.**—*C.E.P.B*

5.6–284 551.594.7:523.75:621.396

Bain, W. C., **Observations on the propagation of very long radio waves reflected obliqu from the ionosphere during a solar flare.** *Journal of Atmospheric and Terrestrial Phys* 3(3):141–152, April **1953.** 6 figs., table, 19 refs. **MH-BH**—Describes measurements amplitude and phase of 16 kc/s sky wave Rugby to Aberdeen. Normal diurnal variation apparent height of reflection at normal and oblique incidence is shown and sudden field anc alies at Aberdeen and Edinburgh during solar flares illustrated. It is found that during moderate flare with large zenith distance of sun there is a change of apparent reflection hei for vertical but not for oblique incidence. Phenomena are attributed to a double struct of D layer, the lower layer (at 70 km) being responsible for oblique incidence propagat (including atmospherics) and the upper affected by solar radiation during a flare. *Sub Headings:* **1. Long wave propagation 2. Solar flares 3. Ionospheric reflection.**—*C.E.P.B.*

5.6–285 551.594.7:06 621.396

Baldinger, E. and Schaetti, N., **9. Generalversammlung der Union Radio-Scientifi Internationale (U.R.S.I.) in Zürich (vom 11.–22. September 1950).** [Ninth general meet of the International Scientific Radio Union (U.R.S.I.) in Zürich (Sept. 11–22, 1950).] *Z schrift für angewandte Mathematik und Physik*, 2(3):212–214, May 15, **1951. MH-BH** brief report of the meeting including recommendations for further investigations to the follow Commissions: II. Propagation in the troposphere (further investigation of influence latitude, nature of ground and climate on refractive index, especially for short waves); Ionosphere and propagation of waves; IV, V. Radio noises of terrestrial origin and of ex terrestrial origin. *Subject Headings:* **1. Radiocommunication 2. International Scien Radio Union 3. Conferences.**—*C.E.P.B.*

5.6–286 551.594.7:551.510.

Banerjee, S. S. and Banerjee, D. K. (*Eng. Coll., Banaras Hindu Univ.*), **Scattering of ra waves and horizontal gradient of ionization in the ionosphere.** *Journal of Scientific Industrial Research*, 12B(6):277–279, June **1953.** 3 figs., 4 refs. **DWB**—Multiple scatte signals obtained at vertical incidence with a low-power (2.5 kW) pulse transmitter are discus The mode of propagation between ground and ionosphere is explained and illustrated. F echoes obtained on Feb. 14, 1953 the horizontal gradient of ionization in the atmosphe determined and found to be in agreement with electronic densities measured by the Resea Department of the All India Radio. *Subject Headings:* **1. Radio wave scattering 2. Io spheric scattering.**—*G.T.*

5.6–287 551.594.7:551.510.535

Banerjee, S. S.; Banerjee, D. K. and Rajan, V. D. (*Eng. Coll., Banaras Hindu Univ.*), **attering of short wave radio signals and their bearing on the ionosphere.** *Journal of ientific and Industrial Research*, 12A(6):278–282, June **1953.** 5 figs., 15 refs. **DWB**—ter reviewing earlier investigations of scattered radio echoes, the authors report recent search on the scattering of short wave radio signals conducted at the Banaras Hindu Univ., ngineering College laboratory. Observations were made with a high-power transmitter at plique incidence and a low-power transmitter at vertical incidence. Results of the observa-ons are discussed. A marked correlation is found to exist between the thickness of the nized layer and the intensity of scattered signals. *Subject Headings:* **1. Radio wave scattering Ionospheric scattering.**—*G.T.*

5.6–288 551.594.7:621.396

Freiesleben, H. C., **Funkortung und Wellenausbreitung.** [Radio direction finding and dio wave propagation.] *Deutsche Hydrographische Zeitschrift*, 5(4):183–188, **1952.** 2 figs., refs. German, English, French summaries p. 183. **DWB**—Existing radio aids to navigation e summarized and errors due to interferences and refraction discussed, including night fects. *Subject Heading:* **1. Radio direction finders.**—*C.E.P.B.*

5.6–289 551.594:621.396.029

Jehn, K. H. and Staley, R. C., **Correlations of 100 MC radio propagation with certain eteorological variables.** *Journal of Atmospheric and Terrestrial Physics*, 3(3):163–171, pril **1953.** 9 figs., 6 refs. **MH-BH**—Signal strengths of 100 MC(3m) waves received at ustin, Texas, from San Antonio (78 mi) and Dallas (175 mi), are compared with meteoro-gical data. It is found that high signal strength is associated with maritime tropical and w with polar continental air. Some relations were found with height of base of refracting ayer but it is suggested that these were due to the presence of multiple refracting layers. A me-height turbulence plot is shown for San Antonio up to 25,000 ft and some relation is ound to signal propagation. *Subject Headings:* **1. Short wave radio propagation 2. Texas.**—*E.P.B.*

ACOUSTICAL PHENOMENA

5.6–290 551.596

McDonald, W. F., **Does sea fog reflect sound?** *Marine Observer*, 24(163):35–37, Jan. **954. MH-BH**—Experiments in North Atlantic showed that though a "carry over" or echo f a ship's whistle was observed, this was probably due not directly to fog but to thermal tratification of the air. *Subject Heading:* **1. Acoustical phenomena.**—*C.E.P.B.*

PART II. ANNOTATED BIBLIOGRAPHY ON NUMERICAL FORECASTING

By: *Mollie P. Kramer and Malcolm Rigby*

INTRODUCTORY NOTE

One of the most rapidly progressing fields of research in meteorology is that of **Numerica Forecasting.** Attempts to compute future atmospheric conditions by rapid numerical integration o the hydro- and thermo-dynamical equations are becoming increasingly successful as meteorologists mathematicians, physicists and engineers cooperate in designing new electronic computers especiall adapted to handling equations descriptive of atmospheric processes. Examples of such computer are the "Leo" in Great Britain (5F–83), the "Bark" and "Besk" in Stockholm Sweden (5F–71, –67 and the "Maniac" at Princeton (5F–88). Research at these three centers, at the Geophysics Re search Directorate, Cambridge, Mass. and at the U. S. Weather Bureau is also progressing along th line of devising a model with the optimum number of layers or parameters to account for the majo effects of baroclinicity in the atmosphere, such as the variation of wind in the vertical and changes i absolute vorticity as observed in cases of cyclogenesis and development. For a general classificatio of those papers dealing with the description and use of barotropic models (atmosphere of uniform den sity without temperature contrasts or friction; thicknesses between all isobaric surfaces constant; ab solute vorticity conserved) or of baroclinic models (flow in which surfaces of constant density do no coincide with isobaric surfaces; winds vary with height; absolute vorticity is not conserved) see th *Outline of Contents* below. The *Outline* will also serve as a guide to the variety of techniques (*e.g* graphical, 5F–61; integration, 5F–65; relaxation, 5F–11; iterative, 5F–49) employed in the prepara tion of the equations for machine forecasting as well as in the solution of those equations. Certai items such as Craig (5F–8) and Gilman (5F–30) are included as random examples from large fields o related literature.

The asterisk (*) is used to denote a good source of data and the dagger (†) a good source o references. The library symbol **MCM** identifies material most easily available at the Massachusett Institute of Technology Library in Cambridge, Mass.

We wish to express our appreciation to Dr. Joseph Smagorinsky of the U. S. Weather Burea whose interest in this specialized field, and cooperation facilitated the preparation of the *Outline* o *Contents* below and the inclusion of valuable reference material.

OUTLINE OF CONTENTS

General Survey Works, 5F–20, –23, –25, –31, –37, –41, –46, –47, –52, –53, –62, –69, –70, –73, –75, –80, –87 to –89, –94, –102, –104, –106, –110, –117, –120

Historical Studies, 5F–1, –4 to –6, –8 to –10, –12 to –14, –16, –18 to –21, –26, –42, –85, –112, –119, –121

Scale Analysis, 5F–15, –20, –22, –37

Short Range Forecast Models

Non-filtered (using the primitive equations of motion), 5F–1, –20, –77, –97

Filtered (using the geostrophic and hydrostatic approximations)

Barotropic models, 5F–5, –23, –35, –44, –48, –63, –116

Linear, 5F–4, –5, –20, –21, –23, –28, –31, –36, –37, –43, –44, –46, –51, –55, –63, –79, –80, –92

Non-linear, 5F–5, –8, –25, –26, –34, –35 –37, –39, –48, –55, –56, –60, –61, –78 –85, –91, –99

Multi-parameter baroclinic models, 5F–5 –9, –10, –12 to –14, –18, –20, –26, –32 –37, –38, –42, –44, –45, –48, –54, –58 –59, –64, –65, –76, –81 to –85, –90, –9 –101, –103, –107, –108, –112, –116

Orographic Influences, 5F–21, –30, –85

Non-adiabatic and Frictional Influences, 5F–1 –21, –37, –38, –85

Forecasting of Weather Elements, 5F–1, –3, –42 –54, –85, –91, –104, –111

Height Tendency Computation, 5F–20, –21, –23 –35, –36, –38, –43 to –45, –48, –56, –63, –64 –76, –79, –81, –84, –86, –90 to –92, –94, –101 –107, –113

Long Range Forecasting, 5F–4, –33, –86

athematical Techniques, 5F–1, –2, –6, –7, –20, –21, –26, –28, –29, –37, –57, –66, –68, –73, –85, –96, –105
Relaxation methods, 5F–11, –17, –29, –35, –57, –64, –65, –95
Graphical methods, 5F–16, –60, –61, –99
Iterative methods, 5F–49, –94
Grid selection, 5F–2, –56, –60, –64, –85, –94
Integration techniques, 5F–60, –65, –86
Matrix methods, 5F–68, –100
Statistical techniques, 5F–86, –118
Data Processing, 5F–1, –25, –37, –65, –72, –102, –110
Map analysis, 5F–24
Communication problem, 5F–50
Computing Machines, 5F–27, –40, –41, –53, –67, –71, –73 to –75, –88, –93, –98, –104, –109, –110

BIBLIOGRAPHY ON NUMERICAL FORECASTING

1922

5F–1 551.509.312

Richardson, Lewis Fry, **Weather prediction by numerical process.** Cambridge, England, niversity Press, **1922.** 236 p. figs., maps, tables, refs., eqs. **DWB**—Account of an elaborate thod (founded upon the differential equations) for expressing all existing atmospheric processes in mbers and of applying a numerical integrating process to give the state of the atmosphere at a er time. A highly simplified example is given early in the discussion, followed by a considerable boration of the method, and, finally, by a full-fledged example worked out on computing forms. sults were not good due supposedly to inaccurate wind data. The method was very tedious. *ame item as* 3E–23 in May 1952, *MAB.*) *Subject Heading:* **1. Numerical forecasting.**—*U. S. eather Bureau abstract.*

1928

5F–2 517.2:53

Courant, R.; Friedlichs, K. and Lewy, H., **Über die partiellen Differenzengleichungen der athematischen Physik.** [On partial difference equations in mathematical physics.] *Mathe-atische Annalen,* 100:32–74, **1928.** 10 figs., 30 eqs. **DLC**—An extensive review of techniques volving partial difference equations in physics containing considerable information essential to merical forecasting. In Pt. I, on the elliptical case, discussion includes: 1) difference equations; boundary and eigen-value problems and Green's function; 3) their relationships to problems of ndom motion and 4) boundary conditions for the solution of the differential equation. In Pt. II, the hyperbolic case, the authors go on to discuss: 1) the equation of a vibrating string; 2) the fluence of grid selection and the dependency regions of difference and differential equations; boundary conditions for an arbitrary right angle grid and 4) the oscillation equation in three riables. The supplement (p. 67) is devoted to discussion and examples of: 1) the differential uation of the first order; 2) the heat transfer equation; 3) the general linear homogeneous differ-tial equation of the second order in a single plane; and 4) the initial value problem of an arbitrary perbolic linear differential equation of the second order. *Subject Headings:* **1. Mathematical chniques 2. Boundary-value problems.**—*M.P.K.*

1932

5F–3 551.509.312:551.515

Angervo, J. M., **Beispiele zur numerischen Vorausberechnung retrograder Tiefdruckbahnen.** Examples of numerical calculation of retrograde cyclone tracks.] *Beiträge zur Geophysik,* 37(1):1–6, **932.** 6 charts, 12 refs., 3 eqs. **DLC**—Using equations for the movement of high or low pressure nters derived in an earlier study (1928), the author applies them to two cases in which low pressure eas were centered approximately NE of Scotland. Numerical calculations indicated the cyclone ovement would become retrograde when other forecast methods would have called for the usual stward movement of the storm centers in question. *Subject Headings:* **1. Numerical forecasting Retrograde cyclones 3. Cyclone track forecasting.**—*M.P.K.*

1939

5F–4 551.509.33:551.513

Rossby, Carl-Gustav and others, **Relations between variations in the intensity of the zonal rculation of the atmosphere and the displacements of the semi-permanent centers of action.** *ournal of Marine Research,* 2(1):38–55, **1939.** 13 figs., 5 tables, 9 refs., 44 eqs. **DWB**—Paper tempts to interpret, from a single point of view, several at first sight independent phenomena rought into focus through synoptic investigations carried on at M.I.T. Interpretation is largely ased on a consideration of the changes in vorticity which must occur in vertical air columns which

are displaced from one latitude to another. Considering the very simplest case of an ideal (no frictional) homogeneous, incompressible atmosphere in purely horizontal motion, the author co presses the two equations of motion (by eliminating pressure) into a single equation expressing t conservation of absolute vorticity. He goes on to show that latitude variations are sufficient bring about the required vorticity variations. (*Same item as* 2A–93, Jan. 1951, *MAB.*) *Subj Headings:* **1. Zonal index 2. Vorticity balance 3. Numerical forecasting.**

1940

5F–5 551.5

Rossby, Carl-Gustav, **Planetary flow patterns in the atmosphere.** *Royal Meteorological Socie Quarterly Journal*, v. 66, Suppl:68–87, **1940.** 4 figs., 5 refs., 77 eqs. **DWB**—Of historical inter to anyone concerned with baroclinic models of the atmosphere is this paper of Rossby's in wh he defines potential vorticity (p. 72) in the course of a theoretical discussion of "the factors det mining the character of the prevailing flow patterns in the atmosphere and the conditions un which these flow patterns tend to remain stationary or to change." It is emphasized that th determining factors are found in the vorticity distribution and that "the displacement of the press field is a secondary effect." Author derives vorticity theorem and applies it to a study of dynamic stability of deep westerly and easterly winds and of the nature of the flow patterns t result from the application of small disturbing impulses to such current systems. *Subject Headin* **1. Planetary circulation 2. Potential vorticity 3. Dynamics of the atmosphere.**—*M.P.K.*

1941

5F–6 551.50

Ertel, Hans, **Die Unmöglichkeit einer exakten Wetterprognose auf Grund synoptischer Lu druckkarten von Teilgebieten der Erde.** [The impossibility of an exact weather forecast based pressure charts for (small) portions of the earth.] *Meteorologische Zeitschrift*, 58(9):309–313, Se **1941.** 2 figs., 8 refs., 31 eqs. **DWB**—It is demonstrated mathematically that it is not possible obtain an unambiguous solution to the problem of pressure (or wind) field at a time $t>0$ for e a homogeneous and incompressible atmosphere, on the basis of initial conditions in a given port of the earth, since the boundary conditions depend on unknown factors outside the area. Furt complications such as thermodynamic processes, changes in stability, cloud and precipitation, e are to be considered. *Subject Headings:* **1. Numerical forecasting 2. Boundary conditions.**—*M*

5F–7 517.51:551.509.

Stumpff, Karl, **Trigonometrische Interpolation und Extrapolation von Beobachtungsreih** [Trigonometric interpolation and extrapolation of series of observations.] *Berlin. Univers Meteorologisches Institut, Veröffentlichungen*, 4(3), **1941.** 52 p. 16 figs., 8 tables, eqs. **DLC**— work discusses analysis of series of observations: 1) to replace a smoothed curve by a few superp sine curves and 2) as a basis for extrapolation. Harmonic analysis alone does not provide a suit basis. Possibilities of making a closer approximation and of making fuller use of the end mem of the series are studied. Important is the "half-wave method" in which a small easily determi correction is applied; examples are given. Possibilities of extrapolation are discussed, inclu freehand, periodogram based on incomplete waves, multiple correlation and differential equati Application to forecasting meteorological processes is considered; although there are many difficul there are possibilities of improving the methods. *Subject Headings:* **1. Interpolation 2. Ex polation 3. Numerical forecasting.**—*C.E.P.B.*

1945

5F–8 551.509

Craig, Richard A., **A solution of the non-linear vorticity equation for atmospheric mot** *Journal of Meteorology*, 2(3):175–178, Sept. **1945.** 5 refs., 35 eqs. **DWB**—Author illustrates "the vorticity equation can be solved without linearization and shows that the zonal index is significant in determining the velocity of a trough as was previously thought" (Rossby 1939; H witz 1940). Disadvantages and limitations of method are recognized but eventual applicatio forecasting is indicated. *Subject Headings:* **1. Numerical forecasting 2. Vorticity equation** *M.P.K.*

1946

5F–9 551.50

Haurwitz, Bernhard, **An investigation of Kibel's method of forecasting.** *American Mete logical Society, Bulletin*, 27(9):499–508, Nov. **1946.** 6 figs., 2 tables, 2 eqs. **DWB**—In an invest tion (1944) at M.I.T. the author studied the practical procedures adopted by Kibel' both in the of the first and the second approximation and checked the applicability of Kibel's method to f

sting. The results of the check proved to be unsatisfactory, contrary to the success the Russians ported with this method. One of the main difficulties in applying the second approximation is the termination of the required second order derivatives from the weather map. Author expresses ope that the method can be further improved. (*See* 5F–10 below.) *Subject Headings:* **1. Numerical recasting 2. Objective forecasting 3. Kibel's method of forecasting.**—*M.P.K.*

5F–10 551.509.33

Izvekov, B. I., **Professor I. A. Kibel's theoretical method of weather forecasting.** *American eteorological Society, Bulletin*, 27(9):488–497, Nov. **1946.** 2 refs., 10 eqs. Trans. by A. G. Alexeef om: *Meteorologiia i Gidrologiia*, No. 5:15–25, **1941.** **DLC**—Explanation of the theoretical derivaons leading to KIBEL's method (*see* 5F–112 below). The first basic equation $(T_o p_o) = \text{grad } T_o \times \text{grad}$ serves for the determination of the derivatives of the temperature T_o and the pressure p_o with spect to time. To construct the second necessary equation, KIBEL' includes the conditions of the opopause, assuming the latter to be a hydrodynamic discontinuity surface always consisting of the me particles. Equations I and II are then solved to a first approximation which shows good rrelation with reality and may be used for some forecasting. To forecast cyclone development, eepening and filling it is found necessary to use the second approximation. Finally, a different nd more complicated system of equations is explained (assuming that the change in temperature ith height is considered as depending upon all three space coordinates and time) and its applicability forecasting mentioned. *Subject Headings:* **1. Numerical forecasting 2. Kibel's method of recasting. I. Kibel, I. A. II. Alexeef, Alexander G.** (*trans.*)—*M.P.K.*

5F–11 518:53

†Southwell, Richard Vynne, **Relaxation methods in theoretical physics.** Oxford, Clarendon ress, **1946.** 248 p. 116 figs. (some fold.), 8 tables, bibliog. p. 239, numerous eqs. **DLC**—This extbook "extends to a different class of problems the outlook and methods of the author's 1940 reatise, 'Relaxation methods in engineering science'," which dealt with systems of finite freedom nd with equations in one independent variable. The second book "applies the same notions to artial differential equations involving two independent space-variables and to conditions which ust be satisfied at a given boundary." Separate chapters include the application of relaxation ethods to plane-potential problems, to problems of conformal transformation, to 'quasi-plane-otential' problems, and to problems involving boundaries or interfaces not initially known. Formulas and tables for use in numerical computation included (p. 229). *Subject Headings:* **1. Relaxaon methods 2. Textbooks.**—*M.P.K.*

1947

5F–12 551.509.33

Kibel', I. A., **Prognoz pogody kak zadacha dinamicheskoĭ meteorologii.** [Weather forecasting s a problem of dynamic meteorology.] [In: Akademiia Nauk, SSSR, **IUbileinyĭ Sbornik.** Pt. I, p. 443–453, **1947.** 2 photos, 28 eqs.] **DLC**—The basic principles of the numerical method of orecasting developed by the hydrodynamic meteorologists FRIDMAN, KOCHIN and KIBEL' are outined and the questions which are used to bring in the factors of radiative balance, temperature radient, turbulent diffusion, distribution of water vapor and heat supplied by evaporation and ondensation are presented. The method derives from suggestion made by V. BJERKNES (Leipzig, 913) and elaborated by L. F. RICHARDSON (1922) that weather prediction can be an exact mathemaical science if all of the physical factors are properly integrated. This method of KIBEL' involves the olution of equations of the 4th order but, by much simplification, is reduced to a process of calculaion which would give in less than half an hour, forecasts of wind, pressure and temperature for one oint for a period of 24 to 36 hours in advance. The success of the forecasts naturally depends on omplete and accurate observations for the area surrounding the point and for the layer of atmosphere rom the ground to the tropopause. (*Same item as* 2.1–53, Jan. 1951, *MAB.*) *Subject Headings:* **1. Numerical forecasting 2. Kibel's method of forecasting.**—*M.R.*

5F–13 551.511

Sutcliffe, R. C., **A contribution to the problem of development.** *Royal Meteorological Society, Quarterly Journal*, 73(317/318):370–383, July/Oct. **1947.** fig., 7 refs., 16 eqs. **DWB.** Abstract in: Pennsylvania. State College. Mineral Industries Experiment Station, Contract N189s-80323, Final Report, **1951.** p. B-293. **DLC**—Subject to various approximations it is shown that the relative (isobaric) divergence between two pressure levels is given by:

$$Z(\text{div}_p V - \text{div}_p V_o) = -V' \frac{\partial}{\partial s}(Z+\zeta+\zeta_0) = -V' \frac{\partial}{\partial s}(Z+\zeta+2\zeta_0),$$

where V' is the relative wind (or shear), Z the Coriolis parameter, ζ and ζ_0 the vorticities at the two levels and $\frac{\partial}{\partial s}$ denotes differentiation in the direction of shear. The formula can be used to explain

thermal steering and other development processes and is adaptable to the routine forecasting problem *Subject Headings:* **1. Numerical forecasting 2. Development theory 3. Divergence 4. Thermal steering.**—*Author's abstract.*

1948

5F–14 551.5(02

Belinskiĭ, V. A., **Dinamicheskaia meteorologiia.** [Dynamic meteorology.] Moscow, OGIZ **1948.** 703 p. 162 figs., 57+tables, 40 refs., numerous eqs., 23 appends. **DLC**—In Chap. XX of this monumental textbook on dynamic meteorology is a complete exposition of the theoretical method of forecasting devised by I. A. Kibel' (*see* 5F–12 above). This numerical system is based on an integration of the equations of motion and attempts to utilize all surface and aerological data for a single station or a limited area to obtain (for the next day) the pressure change and the wind, from the pressure and temperature fields from the surface to the tropopause boundary layers. The first approximation is developed in detail and the method for computing it graphically shown. In Chap. XXI, §5, an objective method of predicting diurnal temperature changes from radiative heat exchange equations (method of M. E. Shvets, 1943) is presented and in §6 the modification of air masses under the influence of the underlying surface is considered in great detail. (*Same item as* 3E–243, May 1952, *MAB.*) *Subject Headings:* **1. Numerical forecasting 2. Integration techniques 3. Kibel's method of forecasting 4. Equations of motion.**—*M.R.*

5F–15 551.513:551.509.313

Charney, Jule G., **On the scale of atmospheric motions.** *Geofysiske Publikasjoner*, Oslo, 17(2) **1948.** 17 p. fig., 16 refs., 74 eqs. **DWB**—The method (used in author's "Dynamics of long waves in a baroclinic westerly current" 1947) of "using the geostrophic approximation in certain terms of the equations of motion to filter out meteorologically insignificant wave solutions is extended to apply to the most general large-scale motions. It is shown how the geostrophic approximations along with the hydrostatic, adiabatic and horizontal approximations, can be incorporated into the general equations of motion to obtain a dynamically consistent set of simplified equations applicable to all large-scale motions." Author first formulates an adequate theory of meteorological approximations, next incorporates the geostrophic approximation into the equations of motion, then applies the simplified equations to wave motion and, finally, discusses the prognostic use of the tendency equations. *Subject Headings:* **1. Equations of motion 2. Geostrophic approximation 3. General circulation 4. Numerical forecasting.**—*M.P.K.*

5F–16 551.515.8

Ertel, Hans, **Eine Methode zur approximativen Vorausberechnung von Luftmassenverlagerungen.** [A method for approximating the future displacement of air masses.] *Deutsche Akademie der Wissenschaften, Berlin, Math.-naturwiss. Klasse, Sitzungsberichte*, No. 31, **1948.** 18 p. 3 figs. 8 refs., 50 eqs. **DWB.** Trans. of author's abstract by H. Dean Parry in: Pennsylvania. State College. Mineral Industries Experiment Station, Contract N189s-80323, Final Report, **1951** p. B-317. **DLC**—For the purpose of short-range weather forecasting, a system of equations is developed analytically which serves to answer, as a first approximation, the question of which air mass will arrive at a given locality at some future time. The solution of this system of equations results from a process of successive approximations whose convergence conditions are determined. For practical application, a simple graphical method can be given. *Subject Headings:* **1. Numerical forecasting 2. Air mass movement forecasting. I. Parry, H. Dean** (*trans.*).—*From author's abstract.*

5F–17 518.

Fox, L. (*Natl. Physical Lab., Teddington, Middlesex, Eng.*), **A short account of relaxation methods.** *Quarterly Journal of Mechanics and Applied Mathematics*, Oxford, Eng. 1:253–280, **1948** 13 figs., 7 tables, 9 refs., 32 eqs. **DWB**—The relaxation method is a process of steadily improved approximation for the solution of simultaneous equations, and any problem that can be formulated in terms of simultaneous equations can, theoretically, be solved by this method. The solution of ordinary simultaneous equations is illustrated by an example, and devices are suggested for increased convergence. The use of finite differences is demonstrated, whereby differential equations are replaced by finite difference equivalents, and the solution of a differential equation is effected by solving a set of simultaneous equations, the unknowns being the values of the required function at pivotal points of a range or ranges of integrations. Attention is focused on partial differential equations of the second order in two variables, with brief consideration of other partial differential equations. Summary of problems already successfully solved by relaxation methods included. *Subject Headings:* **1. Relaxation methods 2. Mathematical techniques.**—*From author's summary.*

5F–18 551.509.3

Lettau, Heinz, **On Kibel's method of forecasting in relation to Exner's theory.** *American Meteorological Society, Bulletin*, 29(4):201–202, April **1948.** 6 refs., eq. **DWB**—Brief comparison

the similarity between the "first approximation" of KIBEL's method (*see* 5F–10 above) and a dy of EXNER's published in 1906. "Second approximations" differ considerably. According to HERHAG, neither system can be successful in cases where considerable deviation exists between the ound and the high level field of meteorological conditions. *Subject Headings:* **1. Numerical fore-sting 2. Kibel's method of forecasting.**—*M.P.K.*

5F–19 551.509.312

Vernič, Rudovan, **Richardsonova numerička prognoza vremena.** [Richardson's method of merical weather forecasting.] *Yugoslavia. Hidrometeorološka Služba. Hidrometeorološki asnik*, 1(2):88–98, **1948.** In Croatian. **DWB**—RICHARDSON's "Weather prediction by numerical ocess" (*see* 5F–1 above) is reviewed and criticized. It is pointed out that the method, which nsists in formulating equations for certain variables and then integrating those equations, cannot e into account the actual correlation of a variable with the development of weather at a given ne. It is further pointed out that by the introduction of restrictions and modifications for certain ments (some of which cannot even be evaluated numerically) the system becomes over-com-cated. Several other objections are made from mathematical, physical and logical points of view, hough the author states that RICHARDSON's contribution is outstanding in the field. (*Same m as* 5.3–97, March 1954, *MAB.*) *Subject Headings:* **1. Numerical forecasting 2. Richardson's thod of forecasting. I. Richardson, Lewis F.**—*G.T.*

1949

5F–20 551.513:551.509.312

Charney, Jule G., **On a physical basis for numerical prediction of large-scale motions in the nosphere.** *Journal of Meteorology*, 6(6):371–385, Dec. **1949.** 6 figs., 16 refs., 45 eqs. **DWB.** stract in: Pennsylvania. State College. Mineral Industries Experiment Station, Contract 189s-80323, Final Report, **1951.** p. B-207. **DLC**—To eliminate the small-scale "noise" dis-rbances which create difficulties for the numerical integration of the equations of motion, a filtering thod is devised which consists essentially in replacing the primitive hydrodynamical equations combining the geostrophic and hydrostatic equations with the conservation equations for potential mperature and potential vorticity. In this way a single equation in the pressure is obtained for the tion of the large-scale systems. A method is suggested for its numerical integration. Discussion the spread of data required for a short-period forecast (in terms of the rate of spread of influences "signal velocity" in the atmosphere) indicates that numerical forecasts for periods of one or rhaps two days are possible for certain areas of the earth but that forecasts for longer periods quire a greater spread of observation stations than is available. Finally the three-dimensional recast problem is reduced to a two-dimensional one by the construction of an "equivalent-baro-pic" atmosphere. Method is applied to the calculation of the 500 mb height tendency, and the sults are compared with observations. Rule is derived for determining the positions of the isallo-ptic centers from the field of the absolute-vorticity advection. (*Same item as* 3–55, March 1950, *AB.*) *Subject Headings:* **1. Numerical forecasting 2. Equivalent barotropic theory 3. Height ndency computation 4. Integration techniques 5. Barotropic models.**—*From author's abstract.*

5F–21 551.509.317:551.509.33

Charney, Jule G. and Eliassen, Arnt, **A numerical method for predicting the perturbations in the iddle-latitude westerlies.** *Tellus*, 1(2):38–54, May **1949.** 13 figs., 2 tables, 9 refs., 45 eqs. **DWB.** bstract in: Pennsylvania. State College. Mineral Industries Experiment Station, Contract 189s-80323, Final Report, **1951.** p. B-206. **DLC**—It is shown that the large-scale quasi-stationary sturbances of the middle-latitude westerlies are produced by the forced ascent of the westerly rrent over the continental land masses. Friction is found to have an important modifying effect the motion. Using these results, a numerical method is devised for predicting the height profile the 500 mb pressure surface at a fixed latitude. The method involves the use of the notion of an equivalent-barotropic atmosphere" and of the geostrophic approximation. Six actual forecasts e made for a period of one day and the results compared with observation. The accuracy obtained thought to justify incorporation of the method into day-to-day forecast procedures. (*Same item as* -48, Feb. 1950, *MAB.*) *Subject Headings:* **1. Numerical forecasting 2. Stationary perturbations Equivalent barotropic theory 4. Geostrophic approximation 5. Height tendency computation.**—*uthors' abstract.*

5F–22 551.511:533.6

Eliassen, Arnt, **The quasi-static equations of motion with pressure as independent variable.** *eofysiske Publikasjoner*, 17(3), **1949.** 44 p. 2 figs., 22 refs., 33 eqs. **DWB**—It is shown that ressure may be used consistently as an independent variable instead of height, in any quasi-static reatment of atmospheric motion. Simpler equations better suited for use with aerological charts sult. Chap. I deals with the quasistatic equations in Cartesian coordinates; Chap. II, with the

quasi-static equations with pressure as the vertical coordinate; Chap. III, with the effect of t curvature of the earth; Chap. IV, with quasi-static gravitational waves on a non-rotating eart Chap. V, with the theory of perturbations of a westerly current; and Chap. VI, with the theory quasi-geostrophic motion. *Subject Headings:* **1. Equations of motion 2. Mathematical technique —*M.P.K.***

5F–23 551.509.

Lönnquist, Olov, **The numerical prediction method for upper air profiles tried on some regul type profiles.** *Tellus*, 1(4):53–57, Nov. **1949.** 6 figs., 2 tables, 3 refs., 2 eqs. **DWB**—CHARNI and ELIASSEN's numerical methods of predicting height of 500 mb surface 24 hours ahead are modifi and extended to provide for 48 hour predictions of certain simple wave patterns. Sinusoidal a quasisinusoidal profiles are discussed and illustrated, and attempts are made in the tests at supe imposing two profiles on each other. Deepening can be accounted for in three different ways by t method. (*Same item as* 4–32 in April 1950, *MAB.*) *Subject Headings:* **1. Height tendency co putation 2. Numerical forecasting 3. Upper air charts 4. Waves in the westerlies.**—*M.R.*

5F–24 551.509.

Panofsky, Hans A., **Objective weather-map analysis.** *Journal of Meteorology*, 6(6):386–3 Dec. **1949.** 13 figs., 2 tables, 2 refs., 3 eqs. **DWB**—A comparison of objective and subjecti methods of analyzing wind and pressure fields with an example from a situation in the Easte United States on Dec. 2, 1945. Objective analysis involved determination of pressures above giv coordinates with a minimum of smoothing (to eliminate local or temporary irregularities or obser tional errors). This method is satisfactory for determining pressure contours, streamlines, h zontal divergence and vertical velocities and fairly satisfactory for computing pressure gradients, geostrophic deviations can only be determined reliably by falling back on subjective interpretati of apparent tendencies vs. possible errors or insufficiencies of data or smoothing methods. (*Sa item as* 3E–145, May 1952, *MAB.*) *Subject Headings:* **1. Objective weather map analysis 2. S optic analysis.**—*M.R.*

1950

5F–25 551.50

Charney, Jule G., **Progress in dynamic meteorology.** *American Meteorological Society, Bulle* 31(7):231–236, Sept. **1950.** Italian trans. in: *Rivista di Meteorologia Aeronautica*, 11(1):3–9, Ja March **1951. MH-BH**—A general non-mathematical survey of the principal developments dynamic meteorology during the past 50 years. Author discusses the work of V. BJERKNES a associates in integrating the equations of hydrodynamics and thermodynamics to describe and pred the state of the atmosphere; J. BJERKNES' studies on the motion of the upper air and his developm of the barotropic model; C.-G. ROSSBY's adoption of a nondivergent barotropic model of the atm phere; the general circulation theory of ROSSBY and the possibility of numerical prediction dynamical methods. (*Same item as* 2.1–42, Jan. 1951, *MAB.*) *Subject Headings:* **1. Dyna meteorology 2. Progress in meteorology 3. Numerical forecasting 4. Barotropic models.**—*I.L.*

5F–26 551.509.3:551.

Charney, Jule G.; Fjørtoft, R. and Neumann, J. von, **Numerical integration of the barotr vorticity equation.** *Tellus*, 2(4):237–254, Nov. **1950.** 7 figs., 7 refs., 41 eqs. **MH-BH.** Abstr in: Pennsylvania. State College. Mineral Industries Experiment Station, Contract N189s-80 Final Report, **1951.** p. B-297. **DLC**—Making use of the high speed ENIAC computing machi the authors integrated the barotropic vorticity equation over a finite area of the earth's surf Data was obtained from U. S. Weather Bureau 500 mb analyses for North America and the N Atlantic region, and a series of 24-hour forecasts made and analyzed. Height changes at 500 and 1000 mb baroclinic tendencies were computed and found to agree with sea level tenden Errors were found arising from assumption that winds are parallel at all heights, and from use o approximate difference equation. The possibility of reducing errors due to the effect of baroclini is examined. It was found that most troughs (16 out or 20) moved too slowly. It should possible to make calculations for 24-hour forecasts in 12 hours by this method. (*Same item* 2.8–35, Aug. 1951, *MAB.*) *Subject Headings:* **1. Numerical forecasting 2. Vorticity equati 3. Height tendency computation 4. Electronic computers.**—*M.R.*

5F–27 681.1

Engineering Research Associates, Inc., **High-speed computing devices.** New York, Lon McGraw-Hill Book Co., **1950.** 471 p. figs., tables, refs., eqs. **DLC**—A discussion of the mechan devices and electrical circuits which can be incorporated into computing machines. Description a few American computers are included to provide examples of the integration of techniques components into complete systems. *Subject Headings:* **1. Computing machines 2. Electr**

mputers 3. Textbooks. I. Tompkins, C. B. II. Wakelin, J. H. III. Stifler, W. W., Jr.—*From uthors' preface.*

5F–28 551.501.4:551.513:551.509.33

Forsythe, George E., **Solution of the telegrapher's equation with boundary conditions on only ne characteristic.** *U. S. National Bureau of Standards, Journal of Research*, 44(1):89–102, Jan. 950. 2 tables, 12 refs., 53 eqs. **DLC**—The solution to the problem presented by Rossby of forecasting planetary flow under idealized conditions, is represented by a Green's function. Method of computing tables described. Tables of Green's function for every 5° of longitude for 14 time alues are given to 5 decimal places. (*Same item as* 10–14, Oct. 1950, *MAB.*) *Subject Headings:* . **Numerical forecasting 2. Planetary circulation 3. Green's function.**—*M.R.*

5F–29 518.2

Frankel, Stanley P. (*Calif. Inst. of Tech.*), **Convergence rates of iterative treatments of partial ifferential equations.** *Mathematical Tables and Other Aids to Computations*, Wash., D. C., 4(30):65–5, April **1950.** 8 refs., 45 eqs. **DWB**—The development of high-speed digital computers has made easible the numerical solution by iterative methods of some partial differential equations. The onvergence rates of several such iterative methods are estimated here. The iterative methods here onsidered are related to the various forms of the Southwell "relaxation method" (*see* 5F–11) in that hey involve successively applied local corrections to improve an approximate solution. Unlike he Southwell method, however, these iterative methods (including the Richardson and Liebmann) re routinized in conformity with the requirements of automatic computers. *Subject Headings:* . **Digital computers 2. Relaxation methods 3. Iterative methods.**—*From author's introduction.*

5F–30 551.558.21

Gilman, C. S. and Weiss, L. L., **A numerical solution for irrotational flow over a mountain barrier.** *American Geophysical Union, Transactions*, 31(5), Pt. 1:699–706, Oct. **1950.** 4 figs., 2 tables, 6 refs., eqs. **MH-BH**—The "relaxation method" is applied to Pockels' differential equation of flow up o 10 km over a given barrier 3 km high of sine curve profile with specified boundary conditions. It gives much smaller vertical velocities than those computed by Pockels', but larger than computed by J. Bjerknes' exponential method. (*Same item as* 2.6–91, June 1951, *MAB.*) *Subject Headings:* . **Numerical forecasting 2. Relaxation methods 3. Air flow over mountains.**—*C.E.P.B.*

5F–31 551.509.312

Hollmann, Günter, **Zur numerischen Wettervorhersage. Bericht über J. G. Charney, R. Fjørtoft, J. v. Neumann: Numerical integration of the barotropic vorticity equation. Tellus 2(4), 1950.** [On numerical forecasting. Report on. . . .] *Zeitschrift für Meteorologie*, 4(11):342–345, Nov. **1950.** 8 refs., 3 eqs. **DWB**—A discussion of the possibility of improving forecasts by introducing mathematical methods. Rossby's barotropic field theory is considered but complete barotropy does not fully represent cyclonic conditions. Charney and Eliassen's equations give good results at the 500 mb level. Electronic computing on a model sufficiently complicated to represent the real atmosphere (Princeton Institute for Advanced Study) may realize Richardson's "dream." (*Same item as* 3.3–56, March 1952, *MAB.*) *Subject Headings:* **1. Barotropic models 2. Numerical forecasting 3. Vorticity. I. Charney, J. G. II. Fjørtoft, R. III. Neumann, J. von.**—*C.E.P.B.*

5F–32 551.509.317:551.547

§Sutcliffe, R. C. and Forsdyke, A. G., **The theory and use of upper air thickness patterns in forecasting.** *Royal Meteorological Society, Quarterly Journal*, 76(328):189–217, April **1950.** 25 figs. **DWB**—An important pioneer paper, in which three-dimensional analysis of the troposphere is introduced by the combination of the surface synoptic chart with the 1000–500 mb thickness pattern. Authors give a method of computing $\partial z'/\partial t$, the rate of change of thickness of a selected isobaric layer (conveniently chosen to include most of the troposphere), in terms of the existing distribution of z' and $\bar{z}$, the height of a selected isobaric layer (Charney's equivalent barotropic level). (*Same item as* 6–21, June 1950, *MAB.*) *Subject Headings:* **1. Thickness tendency computation 2. Numerical forecasting.**

1951

5F–33 551.509.312

Aubert, Eugene J., **The application of one-dimensional numerical methods to extended forecasting.** U. S. Weather Bureau, Extended Forecast Section, April **1951.** 27 p. 9 figs., 2 tables, 13 refs., 15 eqs. **DWB**—An attempt is made to determine whether numerical forecasts using the one-dimensional barotropic model of Charney and Eliassen could be used to prepare prognostic charts for up to four days in advance. Forecasts were made for North America and the Atlantic for twelve five-day mean winter cases for the 700 mb level and were compared with routine 5-day forecasts and

found to show some skill, but not enough to use in routine five-day forecasts. Techniques a outlined, formulas derived and illustrative charts included. (*Same item as* 3E–196, May 195 *MAB.*) *Subject Headings:* **1. Numerical forecasting 2. Barotropic models 3. Extended forecas ing. I. U. S. Weather Bureau. Extended forecast Section.**—*M.R.*

5F–34 551.511:551.509.3

Bolin, Bert and Charney, Jule (*Princeton, Inst. for Advanced Study*), **Numerical tenden computations from the barotropic vorticity equation.** *Tellus*, 3(4):248–257, Nov. **1951.** 8 fig refs., 4 eqs. **DWB**—Test computations made for a period of ten days in order to verify usefulness numerical forecasting. Computational errors discussed. Correlation up to 0.70. Best results the region of the Great Lakes. Influence of Rocky Mountains on the large scale upper level fl pattern discussed. (*Same item as* 4.8–87, Aug. 1953, *MAB.*) *Subject Headings:* **1. Numeri forecasting 2. Vorticity equations 3. Forecast verification 4. Great Lakes Region.**—*A.A.*

5F–35 551.501.45:51

Bushby, F. H., **Relaxation methods and their application to meteorological problems.** *Meteo logical Magazine*, London, 80(945):71–77, March **1951.** 5 figs., 8 eqs., 4 refs. **DLC**—Briefly s out relaxation method of solving simultaneous equations by iteration, and differential equations b relaxation net or cubic grid. Finding the instantaneous tendency of the 500 mb surface is given a meteorological example. (*Same item as* 2.11–68, Nov. 1951, *MAB.*) *Subject Headings:* **1. Rela tion methods 2. Mechanics of the atmosphere 3. Height tendency computation.**—*C.E.P.B.*

5F–36 551.50

Bushby, F. H., **Second report arising from Charney and Eliassen's method of computing fo cast 500 mb contour charts.** *Great Britain. Meteorological Research Committee, M.R.P.* 622, S II/73, March 13, **1951.** 5 p. 2 refs. Mimeo. **DWB**—The Charney-Eliassen one-dimensio method of computing a forecast 500 mb contour profile along a parallel of latitude is applied latitudes 40°, 50° and 60°N. The statistical methods for testing the success of the Charney-Elias method are described. The Charney forecasting method has a standard of success that is somew less than that obtained by conventional forecasting techniques. (*Same item as* 3.2–47, Feb. 19 *MAB.*) *Subject Headings:* **1. Numerical forecasting 2. Height tendency computation 3. Equi lent barotropic theory.**—*I.L.D.*

5F–37 551.509.312:551.

Charney, Jule G., **Dynamic forecasting by numerical process.** (In: **Compendium of Mete ology.** Boston, American Meteorological Society, **1951.** p. 470–482. 4 figs., 15 refs., 75 e **DWB**—Sets out the basic assumptions and describes simplified models. Advective models ign the effect of vertical motion on potential temperature. Various numerical methods (e.g., KIB EXNER) of integrating the equations are described. Under the linearized barotropic model, aut discusses group velocities of disturbances, deducing eastward propagation. A method of integra a nonlinear barotropic equation on the Eniac is illustrated and a 24-hour forecast of 500 mb dencies compared with observed values with good results. Finally, the possibility of using primitive Eulerian equations for small perturbations in a barotropic atmosphere and the inclusio condensation and friction effects are discussed. (*Same item as* 3.6–4 in June 1952, *MAB.*) *Su Headings:* **1. Dynamic meteorology 2. Numerical forecasting 3. Integration techniques 4. B tropic models.**—*C.E.P.B.*

5F–38 551.509

Hinkelmann, Karl, **Dreidimensionale Probleme der numerischen Wettervorhersage.** [Th dimensional problems of numerical weather forecasting.] *Meteorologische Rundschau*, 4(11/12):2 213, Nov./Dec. **1951.** 6 refs., 15 eqs. **DWB**—After a discussion of the precalculation of the 500 surface at Princeton (*see* 5F–26 above), the neglected vertical velocity is introduced. The resul equation is very complex but could perhaps be solved by special calculating machines. (*Same ite* 3.6–57 in June 1952, *MAB.*) *Subject Headings:* **1. Numerical forecasting 2. Vertical veloc 3. Height tendency computation.**—*C.E.P.B.*

5F–39 551.509

Hinkelmann, Karl, **Quantitave** (*sic*) **Verfahren zur Vorausberechnung von Luftdruckfe** [Quantitative experiments in calculating pressure fields in advance.] *Annalen der Meteoro* 4(1–6):126–131, **1951.** 6 figs., 2 refs., 3 eqs. German and English summaries p. 126. **MH-E** Attempts to compute future atmospheric conditions by numerical solution of the hydro- and the dynamical equations have given promising results, but the amount of calculation involved an lack of suitable calculating instruments are obstacles. Hence, the author constructs 3 simp equations. These are applied to the 500 mb topography over the N. Atlantic and Europe, at

nd 15 hr on April 5, 1950 to calculate a chart of dh/dt. (*Same item as* 3.3–62, March 1952, *MAB.*) *Subject Heading:* **1. Numerical forecasting.**—*C.E.P.B.*

5F–40 551.501.4

Lingelbach, Ernst, **Neue Zeitsparende Methode zur Ausführung von Rechenoperationen.** [New time-saving method of carrying out calculations.] *Annalen der Meteorologie*, 4(1–6):123–125, 1951. fig., 2 refs. German and English summaries p. 125. **MH-BH**—Outlines a method by which sections of an isobaric chart are represented by black columns and scanned by photocells for actual pressure and differentials. This gives simplified charts on which, by the use of simple governing elements, arithmetical operations can be carried out by selective photocells. In this way, charts can be analyzed and synthesized rapidly enough for practical forecasting. (*Same item as* 3.3–24, in March 1952, *MAB.*) *Subject Heading:* **1. Numerical forecasting.**—*C.E.P.B.*

5F–41 551.509.312:681.14

Lingelbach, Ernst and Hinkelmann, Karl, **Können elektronische Rechenanlagen die Wettervorhersage verbessern?** [Can electronic calculators improve the weather forecasts?] *Das Elektron*, Munich, 5(6):189–192, **1951. DLC**—Authors review the mathematical difficulties (nonlinearity of the differential equations involved, etc.) which have hitherto made mathematical-physical attempts at forecasting impracticable. Although the time element is still a major problem to be overcome, program-controlled electronic computers are invaluable at present for their usefulness in experiments with atmospheric models and for providing information for intermediate upper air charts. With further intense research and cooperation among meteorologists, physicists, mathematicians and technicians, electronic computers capable of definitely improving daily forecasts will become a reality. *Subject Headings:* **1. Electronic computers 2. Numerical forecasting.**—*M.P.K.*

5F–42 551.511:551.509.312

Phillips, Norman A., **A simple three-dimensional model for the study of large-scale extrapolation flow patterns.** *Journal of Meteorology*, 8(6):381–394, Dec. **1951.** 17 figs., 29 eqs., 20 refs. Also: Chicago. University. Dept. of Meteorology, Contract N6ori-20, T.O. II, Technical Report, Aug. **1951. MH-BH**—One of the first numerical integrations of the simple baroclinic model. A study of the hydrostatic motion of two layers of incompressible fluid of different densities subject to small perturbations on a zonal current, treated by methods similar to those of Charney, and giving a measure of the vertical distribution of horizontal velocity divergence. If the initial flow patterns are determined from tropopause flow patterns, the development of the latter can be forecast. This is tested by calculating with some success the sea level tendencies and field of vertical motion (compared with cloud and precipitation) for the great storm of 24–25 Nov., 1950 over the northeastern U. S. Sources of error are discussed. (*Same item as* 3.9-13, Sept. 1952, *MAB.*) *Subject Headings:* **1. Dynamics of the atmosphere 2. Numerical forecasting 3. Baroclinic models 4. Northeastern United States. I. Chicago. University. Dept. of Meteorology II. Contract N6ori-20, T.O. II.**—*C.E.P.B.*

5F–43 551.509.317

Reuter, Heinz, **Zur numerischen Methode der Vorhersage von Änderungen der 500 mb-Fläche nach Charney und Eliassen.** [On the numerical method of forecasting changes of the 500 mb surface according to Charney and Eliassen.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, 4:122–127, **1951.** 4 figs., 3 refs., 2 eqs. German, English and French summaries p. 122. **DWB**—Author investigates the thesis that the day-to-day changes of the 500 mb topography can be calculated from the land topography. (*Same item as* 3.3–63, March 1952, *MAB.*) *Subject Headings:* **1. Numerical forecasting 2. Waves in the westerlies 3. Height tendency computation.**—*C.E.P.B.*

5F–44 551.509.312:551.511

Sawyer, John S. and Bushy, F. H., **Note on the numerical integration of the equations of meteorological dynamics.** *Tellus*, 3(3):201–203, Aug. **1951.** 6 refs., 2 eqs. **MH-BH**—The one-dimensional method of CHARNEY (*see* 5F–26 above) for computing the change on the 500 mb height profile applied to 60 charts, yields a correlation coefficient of +0.54 between predicted and observed height changes along lat. 50°N and +0.35 along lat. 40°N in winter. The success is less than that obtained by conventional forecasting and the failure of the predicted changes is analyzed. Numerical calculations to evaluate the vertical velocities in baroclinic development made with SUTCLIFFE's model indicate that the latter can provide a successful basis for forecasting. (*Same item as* 4.3–79, March 1953, *MAB.*) *Subject Headings:* **1. Numerical forecasting 2. Height tendency computation 3. Baroclinic models.**—*I.L.D.*

5F–45 551.511

Shuman, F. G., Sr., **Solutions of a differential equation of pressure tendency.** Thesis (*D.S.*)—Mass. Institute of Technology, **1951.** Original unchecked. **MCM.** Abstract in: Pennsylvania.

State College. Mineral industries Experiment Station, Contract N189s-80323, Final Report, 195 p. B-267. **DLC**—A differential equation of pressure tendency is derived and solved for two simp sinusoidal models of atmospheric dimensions using an isentropic coordinate system with potenti temperature as an independent variable. In deriving a relation between the wind and pressu fields, hydrostatic equilibrium, dry adiabatic processes and frictionless motion are assumed. means of the geostrophic wind equation, the wind field is eliminated from the relation. The fin expression is a linear differential equation of the same form as the tendency part of a Montgomery stream function, which is analogous to pressure in the Cartesian coordinate system. The coefficien in the equation are functions of Montgomery's stream function and its space derivatives. T theory is applied to model pressure fields in which geostrophic stream lines are sine waves on ise tropic surfaces. In the second model (where the westerly flow varies with height and has a maximu at 200 mb rather than being assumed invariant with height as in the 1st model), the comput pressure tendency is reasonable and the divergence field assumes the commonly observed patte about typical systems. *Subject Headings:* **1. Numerical forecasting 2. Height tendency computati 3. Atmospheric models.**—*From Penna. State College abstract.*

5F–46 551.547.1:551.509.3

†Stephen, F. Briscoe; Moyer, Vance; Taylor, Charles L. and Jones, David L., **A summary a evaluation of the various existing methods and techniques employed in forecasting the heights constant pressure surfaces.** Pennsylvania. State College. Mineral Industries Experime Station, Contract N189s-80323, Final Report, Dec. 31, **1951.** 2 v. v. 1, Text. v. 2, Bibliograp and Abstracts. 28 figs., 5 tables, 344 refs. **DLC**—Contains abstracts (some very long) of over articles which are in one way or another pertinent to the subject of forecasting the heights of consta pressure surfaces or to the analysis which precedes the forecasting. Among the various meth represented in the bibliography and textual discussion is the Charney-Eliassen numerical forecast technique (v. I, p. 88–97: v. 2, abstracts Nos. B-206, B-207, B-297). (For fuller abstract *see* s sequent issues of *MAB.*) *Subject Headings:* **1. Constant pressure surfaces 2. Numerical fo casting.**

5F–47 551.509.3:

Sutton, O. G., **Mathematics and the future of meteorology.** *Weather,* 6(10):291–296, Oct. 19 fig. **DWB**—A philosophical discussion which arrives at the conclusion that indeterminacy due to prevailing instability in the atmosphere will prevent accurate weather prediction by mathemat methods more than a few days ahead. (*Same item as* 3.3–60, March 1952, *MAB.*) *Subject Head* **1. Numerical forecasting.**—*C.E.P.B.*

5F–48 551.5

Watanabe, T., **A note on Charney-Eliassen's numerical prediction.** *Journal of Meteorolog Research,* Tokyo, 3(5):145–150, March **1951.** 7 figs., 6 refs., eqs. In Japanese; English summ p. (11). **DWB**—The method of CHARNEY-ELIASSEN for predicting the height profile of the 500 surface along 45°N latitude is considered limited in its application because of the adoption of small perturbation method. This limitation can be overcome by the generalized trajectory met which considers the effect of horizontal convergence. (*Same item as* 3.4–76, April 1952, *MA Subject Headings:* **1. Numerical forecasting 2. Height tendency computation.**—*I.L.D.*

5F–49 51

Young, D., **Iterative methods for solving partial difference equations of elliptic types.** Sem given at Numerical Analysis Seminar of Ballistic Research Labs, Aberdeen Proving Ground, **1951.** (Based on Ph.D. dissertation, Harvard, 1950.) Original unchecked. *Subject Hea* **1. Mathematical techniques.**

1952

5F–50 551.5

Bellamy, J. (*Cook Electric Co., U.S.A.*), **Comments on the communication problem.** Abst in: *Tellus,* 4(2):140, May **1952.** Paper presented at the University of Stockholm Institut Meteorology Conf., May 12–14, **1952.** Original unchecked. **DWB**—A unitary decimal dig code system which can be read automatically or visually is suggested as a possible solution speeding up the transmission of weather data from the observer to the computing machine or caster. *Subject Heading:* **1. Weather data transmission.**—*M.P.K.*

5F–51 551.509.312:

Berkofsky, Louis (*U. S. Air Force Cambridge Res. Center*), **A numerical prediction experi** *American Meteorological Society, Bulletin,* 33(7):271–273, Sept. **1952.** 2 refs. **MH-BH—** feasibility of preparing 24-hour forecasts of the 500 mb surface by the use of business ma methods was tested under simulated routine operating conditions. The solution tested is based

linearized two-dimensional quasi-barotropic model. Brief description of the procedure is given. 24-hour forecast was prepared in about 11½ hours. Table showing breakdown of procedures cording to elapsed time is included. The possibility of reducing the time needed for a machine recast to 7 hours is indicated. (*Same item as* 4.7–48, July 1953, *MAB.*) *Subject Headings:* **Numerical forecasting 2. Computing machines 3. Barotropic models.**—*I.L.D.*

5F–52 551.509.3:551.511:06

Bolin, Bert and Newton, Harriet, **Report on a conference on the application of numerical methods forecasting atmospheric flow patterns.** *Tellus*, 4(2):141–144, May 1952. **MH-BH**—Conference s held May 12–14, 1952 at the University of Stockholm, Institute of Meteorology. This account ntains abstracts of papers presented by ELIASSEN, BOLIN, NEOVIUS, BELLAMY, FJØRTOFT, KJELLERG, EADY, C. W. NEWTON, VAN MIEGHEM, HINKELMANN, SMEBYE, LÖNNQUIST, CLAPP, CZAPSKI, UORELA and ARNASON, on various aspects of theory, natural and laboratory models and computation oblems. (*Same item as* 5.2–63, Feb. 1954, *MAB.*) *Subject Headings:* **1. Numerical forecasting Conferences.**—*M.R.*

5F–53 551.509.312:681.142

"Brains" forecast weather. *Science News Letter*, 61(12):179, March 22, 1952. fig. **DLC**—eport on the experimental use of electronic computers in forecasting at the Institute for Advanced udy, Princeton, N. J. It is hoped that a computer under construction will reduce forecast preparaon time from 24 hours to ½–1 hour. (*Same item as* 5.3–93, March 1954, *MAB.*) *Subject Headings:* **Electronic computers 2. Numerical forecasting.**

5F–54 551.558.29:551.515:551.509.317

Bushby, F. H., **The evaluation of vertical velocity and thickness tendency from Sutcliffe's theory.** *oyal Meteorological Society, Quarterly Journal*, 78(337):354–362, July 1952. 5 figs., 8 refs., 19 eqs. **WB**—The field of mean vertical velocity in the 1000–500 mb layer due to large scale atmospheric ystems was computed by the development equation of SUTCLIFFE, including the effect of vertical ability and effect on rate of rainfall. Of 6 analyses, that of Feb. 14, 1950 (warm front) is shown in harts. Good first approximations were obtained. (*Same item as* 3.10–209, Oct. 1952, *MAB.*) *ubject Headings:* **1. Vertical velocities 2. Development theory 3. Upper air analysis.**—*C.E.P.B.*

5F–55 551.509.312:551.511.4

Bushby, F. H., **Forecasting methods based on barotropic wave theory.** *Meteorological Magazine*, ondon, 81(955):1–5, Jan. 1952. 8 refs., 3 eqs. **DWB**—Summarizes CHARNEY's method of forecasting changes in height of 500 mb contour. Tests of his 1- and 2-dimensional methods at Dunstable show significant success but less than conventional methods. Some suggestions are made. (*Same item as* 3.7–72 in July 1952, *MAB.*) *Subject Headings:* **1. Numerical forecasting. 2. Barotropic theory.**—*C.E.P.B.*

5F–56 551.509.312

Czapski, U. (*Univ. of Hamburg*), **A comparative study of barotropically computed 500 mb endencies for different grid positions and grid sizes.** Abstract in: *Tellus*, 4(2):143, May 1952. Paper presented at the Univ. of Stockholm, Institute of Meteorology Conf., May 12–14, 1952. Original unchecked. **DWB**—Considerable differences between vorticity fields were obtained if different grid points and grid sizes were used in barotropic computations and similarly for tendency elds. An improvement of the forecast was obtained if all points were included in the computations nstead of every other as was done in the tests reported by BOLIN. It is important that computations e done for every grid point in the grid used. The most feasible grid size needs careful consideration. *ubject Headings:* **1. Grid size 2. Height tendency computation 3. Numerical forecasting 4. Vorticity field.**—*Author's abstract.*

5F–57 551.513:517.3

Eady, E. T. (*Imperial College of Science, London*), **Methods of representation and techniques f integration of Poissons and Helmholtz's equations.** Abstract in: *Tellus*, 4(2):141–142, May 1952. Paper presented at the Univ. of Stockholm, Institute of Meteorology Conf., May 12–14, 1952. Original unchecked. **DWB**—Author indicated some of the main points to be considered when planning the continued integration by mechanical methods of the Poisson and Helmholtz equations ppearing in problems of large scale atmospheric flow. For a single integration, three main methods ave been used, namely Green's function, harmonic (or spherical harmonic) analysis and mechanical 'relaxation"; the last is probably both the quickest and the simplest to programme for large networks, being particularly suitable when spherical coordinates must be used. However, the use of inite difference approximations to differential coefficients leads to errors which may mount up and become serious when the integration is repeated many times. *Subject Headings:* **1. Integration echniques 2. Poisson's equations 3. Helmholtz's equations.**—*Author's abstract.*

5F–58 551.511:551.50

Eady, E. T. (*Imperial College, London*), **Note on weather computing and the so-called dimensional model.** *Tellus*, 4(3):157–167, Aug. **1952.** bibliog., 49 eqs. **MH-BH**—The probl of setting up a system of equations by means of which the future large-scale flow pattern might computed, using an electronic calculating machine, in a reasonable time and with maximum accura and efficiency, is discussed. Equations determining the development of a two-parameter, tw dimensional "model," capable of representing the major features of motion of a baroclinic atmosphe are derived. Tests of the model are made on some representative problems, the accurate thr dimensional solutions of which are known. (*Same item as* 4.6–96, June 1953, *MAB.*) *Subj Headings:* **1. Numerical forecasting 2. Baroclinic models 3. Electronic computers.**—*Autho abstract.*

5F–59 551.511:551.50

Eliassen, Arnt (*Met. Inst., Oslo*), **Simplified dynamic models of the atmosphere, designed the purpose of numerical weather prediction.** *Tellus*, 4(3):145–156, Aug. **1952.** 6 figs., refs., eqs. **MH-BH**—The properties of several atmospheric models, which have been proposed for purpose of numerical computation of prognostic maps, are discussed, and a new version of "$2\frac{1}{2}$-dimensional model" is given. It is pointed out that the "barotropic" model is unable to expl adequately the growth of wave perturbations, and that the advective model gives too strong stability for short waves, whereas the two-layer model and the continuous $2\frac{1}{2}$-dimensional mo seem to describe almost correctly the behavior of waves in a baroclinic current. (*Same item* 4.6–97 in June, 1953, *MAB.*) *Subject Headings:* **1. General circulation 2. Baroclinic moc 3. Numerical forecasting 4. Atmospheric models.**—*Author's abstract.*

5F–60 551.509.312:551.

Fjørtoft, Ragnar (*Univ. of Copenhagen*), **On a numerical method of integrating the barotr vorticity equation.** *Tellus*, 4(3):179–194, Aug. **1952.** 5 figs., 2 tables, refs. **MH-BH**—A met is given by means of which quasi-permanent "velocity" fields may be constructed in which abso vorticity is conserved if the atmosphere is treated as barotropic. For vorticity displacements th fields may be considered as constant for time intervals of the order of magnitude 24 hrs. Se simple approximate integration formulae are given for the Poisson- and Helmholz-equations. graphical procedure is introduced to derive the isolines of vorticity and to perform the integra work. (*Same item as* 4.10–71 in Oct. 1953, *MAB.*) *Subject Headings:* **1. Numerical forecas 2. Integration techniques 3. Vorticity equations 4. Poisson's equations 5. Helmholz's equati** —*Author's abstract.*

5F–61 551.509.312:551.

Fjørtoft, Ragnar, **Preliminary tests of a simplified graphical method for integrating the b tropic vorticity equation.** Abstract in: *Tellus*, 4(2):141, May **1952.** Paper presented at the U of Stockholm, Institute of Meteorology Conf., May 12–14, **1952.** Original unchecked. **DW** By advecting the vorticity field with a spacially-averaged wind field, a 24 hr. forecast may be obta in one time step. Since this whole method is done graphically a forecast may be completed in proximately 3 hrs by one person. Results look encouraging although no statistics are available *Subject Headings:* **1. Integration techniques 2. Vorticity equations 3. Graphical method** *Author's abstract.*

5F–62 551.509

Flohn, Hermann, **Wege zu einer rechnerischen Wettervorhersage.** [Ways to a calcul weather forecast.] *Naturwissenschaftliche Rundschau*, 5(5):198–199, May **1952. DWB**—A summary of the history and present position of numerical forecasting. The electronic comput not yet fast enough. Errors are introduced by the use of difference equations instead of differe equations, and neglect of radiation, friction, etc., but the position is hopeful. (*Same item as* 3.9 Sept. **1952,** *MAB.*) *Subject Headings:* **1. Numerical forecasting 2. History of meteorolog** *C.E.P.B.*

5F–63 551.511:551.50

Gabites, J. F., **Tests of a numerical prediction formula of 500 millibar height profiles.** *Zealand. Meteorological Office, Technical Note*, No. 91, June 9, **1952.** 4 p. table, chart, 10 **DWB**—A series of progressively more complicated atmospheric models suitable for nume prediction is being devised by CHARNEY and collaborators. The prediction formula based o early one dimensional model may be used without computing machines and has been tested moderate success on a series of Southwest Pacific charts for the prediction of the 500 mb h profile along latitude 40°S. (*Same item as* 5.4–96, April 1954, *MAB.*) *Subject Headings:* **1. Nu ical forecasting 2. Height tendency computation 3. Barotropic models 4. Southwest Paci** *Author's abstract.*

5F–64 551.509.312:551.511

Hinkelmann, Karl (*Weather Bureau, Bad Kissingen, Germany*), **A report on preliminary tests in a three-dimensional model in Bad Kissingen, Germany.** Abstract in *Tellus* 4(2):142–143, May 1952. Paper presented at the Univ. of Stockholm, Institute of Meteorology Conf., May 12–14, 1952. Original unchecked. **DWB**—From the quasi-static and geostrophic approximations, a linear, second-order differential equation in the height tendency is derived, using pressure as vertical coordinate. The boundary conditions at the top and the bottom are used in an integrated form to avoid non-centered differences when a finite grid is used. The computation of the coefficients of the equation from the synoptic data is discussed. The equation is solved by relaxation for a standard atmosphere with the inhomogeneous term equal to unity in one gridpoint, and zero in all other points. Three Green's functions for the tendency field computed in this way, and with the disturbance located at 900, 500 and 200 mb, respectively, are demonstrated. *Subject Headings:* **1. Baroclinic models 2. Numerical forecasting 3. Relaxation methods 4. Height tendency computation 5. Grid size.**—*Author's abstract.*

5F–65 551.511:551.509.312

Hinkelmann, Karl; Essenwanger, Oskar; Reymann, G. and Wippermann, Friedrich, **Physikalisch-mathematische Grundlagen der numerischen Integration in einer baroklinen Atmosphäre.** [Physical mathematical bases of numerical integration in a baroclinic atmosphere.] *Germany. Deutscher Wetterdienst in der US-Zone, Berichte*, No. 38:416–428, **1952.** 4 figs., 19 refs., 25 eqs. **DWB**—In Pt. I, prognostic differential equations are formed for the variation with time of isobaric surfaces, the boundaries being the upper limit of the atmosphere and the earth's surface. In Pt. II, the determination of the coefficients and constants of these equations from synoptic charts and aerological data is considered. Pt. III describes the solution of the equations by relaxation methods, with examples of the extension of a disturbance in a static standard atmosphere, showing the importance of stability. In the troposphere a disturbance extends vertically, in the more stable stratosphere, horizontally. (*Same item as* 4.3–8 in March 1953, *MAB.*) *Subject Headings:* **1. Kinematic analysis 2. Dynamics of the atmosphere 3. Numerical forecasting 4. Relaxation methods.** —*C.E.P.B.*

5F–66 518.12

Hyman, Morton A., **Non-iterative numerical solution of boundary-value problems.** *Applied Scientific Research, Ser. B*, The Hague, 2(5):325–351, **1952.** 3 figs., 4 tables, 15 refs., 21 eqs. **DLC**—A method is presented for the numerical solution of boundary value problems. The method is applicable to arbitrary regions in any number of dimensions. The technique of solution is non-iterative and appears well adapted to use with high-speed computing machines. *Subject Headings:* **1. Mathematical techniques 2. Boundary-value problems.**—*Author's abstract.*

5F–67 681.14

Kjellberg, G., **The Swedish electronic computer (BESK).** Abstract in *Tellus*, 4(2):141, May **1952.** Paper presented at the Univ. of Stockholm, Institute of Meteorology Conf., May 12–14, **1952.** Original unchecked. **DWB**—The Swedish machine, a computer of the Princeton type with an internal memory capacity of 256 40-binary digit numbers (to be increased by magnetic drum storage) has a speed and capacity suitable for meteorological purposes. *Subject Heading:* **1. Electronic computers.**—*Author's abstract.*

5F–68 551.509.312:681.142

Karlqvist, Olle, **Numerical solution of elliptic difference equations by matrix methods.** *Tellus*, 4(4):374–384, Nov. **1952.** 3 figs., table, refs. **MH-BH**—A non-iterative method for solving boundary value problems of elliptic difference equations is developed that is based on the simple structure of the triangular matrices obtained by applying the well-known elimination procedure of GAUSS to the matrix of the difference equation. It is proved that the procedure is numerically stable, i.e., there is no tendency to error-growth. The method seems to be particularly suited to such problems as weather forecasting on high-speed computing machines where one has to solve the same equations (e.g., POISSON's or HELMHOLTZ's) a great number of times with the same net but different right member and boundary values. The number of stored constants as well as the computational work in the application of the method is only a fractional part of that required when using the inverse matrix (Green's function). POISSON's equation for a rectangular region is given close study, but the method can be applied to irregular regions and to equations of higher order. (*Same item as* 5.3–96, March 1954, *MAB.*) *Subject Headings:* **1. Numerical forecasting 2. Poisson's equations 3. Helmholtz's equations 4. Electronic computers.**—*Author's abstract.*

5F–69 551.509.312

Lingelbach, Ernst, **Wird die Meteorologie eine exakte Wissenschaft?** [Will meteorology become an exact science?] *Germany. Deutscher Wetterdienst in der US-Zone, Berichte*, No. 38:7–9,

1952. 7 refs. **DWB**—The problem of weather forecasting by mathematical physics, attempt by V. BJERKNES and L. F. RICHARDSON, is being taken up again with new methods of calculatio The difficulties and the changes of practice involved are briefly discussed. (*Same item as* 4.3–7 March 1953, *MAB.*) *Subject Headings:* **1. Numerical forecasting 2. Progress in meteorology.** *C.E.P.B.*

5F–70 551.509

Lönnquist, Olov (*Swedish Met. and Hydrol. Inst.*), **To the comparison between numeric methods and methods in use for forecasting meteorological charts.** *Tellus*, 4(3):182–200, Au **1952.** 2 figs., table, 5 refs. **MH-BH**—Methods now in common use for making prognostic cha to a large extent are based on time derivatives, while the numerical methods start from space d rivatives. That is the fundamental difference between them. It is shown that the present metho give at times very good results, and that the degree of success varies with the weather situatio characterized, e.g., by the average interdiurnal pressure change over the test area. Because of t variation it would be desirable that every test of a numerical method include a comparison w results obtained at some forecasting center or, at least, with the results of pure extrapolation. (*Sa item as* 4.6–61, June 1953, *MAB.*) *Subject Headings:* **1. Numerical forecasting 2. Prognos charts.**—*Author's abstract.*

5F–71 681

Neovius, G., **Demonstration of the Swedish relay-computer (Bark).** Abstract in: *Tel* 4(2):141, May **1952.** Paper presented at the Univ. of Stockholm, Institute of Meteorology Co May 12–14, **1952.** Original unchecked. **DWB**—"Bark" is a Swedish relay computer similar Harvard University "Mark I" and has been in use since spring 1950. An explanation of its ope tion was followed by a demonstration. *Subject Heading:* **1. Electronic computers.**—*Author's abstra*

5F–72 551.509.3

Newton, C. W. (*Univ. of Chicago*), **Comments on the analysis and data problems associat with numerical forecasting.** Abstract in: *Tellus*, 4(2):142, May **1952.** Paper presented at the Un of Stockholm, Institute of Meteorology Conference, May 12–14, **1952.** Original unchecked. **DW** —Since present numerical prognosis methods involve multiple differentiation of the isobaric conte field, the analysis used must be more accurate than those in ordinary forecasting practices. Smoo ness and space- and time-continuity of the vorticity field are essential. Subjective analysis meth must be used at present since objective analysis of any but the larger-scale features of the circulat is very inaccurate due to the inhomogeneity and inaccuracy of radiosonde observations. I improvements in either subjective or objective analysis, an increase in the density of the radio wi finding network is the most urgent need. *Subject Headings:* **1. Numerical forecasting 2. Syno analysis.**—*Author's abstract.*

5F–73 681.14:551.5

Platzman, George W. (*Univ. of Chicago*), **Some remarks on high-speed automatic comput and their use in meteorology.** *Tellus*, 4(3):168–178, Aug. **1952.** 5 figs., tables, 3 refs. **MH-BH** Using as a basis the reports of GOLSTINE and VON NEUMANN, the author discusses the logical des of an electron digital computer, describes a simple problem which illustrates typical steps leading the formulation of a computation, namely, the program, and shows the sequence of logical steps which the control executes the program by means of a flow diagram. The application of high sp automatic computers to forecasting radiational temperature changes in the free atmosphere and forecasting of high level winds over short periods is discussed. (*Same item as* 4.8–35, Aug. 19 *MAB.*) *Subject Headings:* **1. Digital computers 2. Short range forecasting.**—*I.L.D.*

5F–74 681.4:551.509.

Reisch, S. (*R. Inst. of Tech., Stockholm*), **A proposed analog type of computer for use in numer forecasting.** Abstract in: *Tellus*, 4(2):142, May **1952.** Paper presented at the Univ. of Stockho Institute of Meteorology Conference, May 12–14, **1952.** Original unchecked. **DWB**—The p ciples for a machine for solving partial differential equations by relaxation methods were explain By using a "spider" with a series of adjustable heads the information required from the storage fie (magnetic drum or magnetic tape) during the process of relaxation are available simultaneou whereby all transfer problems are simplified considerably. The computational units also be d simpler than those at present in use in electronic computers. *Subject Headings:* **1. Electronic c puters 2. Numerical forecasting 3. Relaxation methods.**—*Author's abstract.*

5F–75 551.509.312:61

Sawyer, John S., **Electronic computing machines and meteorology.** *Meteorological Magaz* London, 81(957):74–77, March **1952.** 2 refs. **DWB**—Brief summary of discussion at Cambri

ngland, Sept. 6, 1951 and Dunstable, Oct. 1951. It is considered that routine application to recasting is unlikely for many years but the prospects for other meteorological problems, especially ynamical research, are more promising. (*Same item as* 3.9–72, Oct. 1952, *MAB.*) *Subject Headgs:* **1. Electronic computers 2. Numerical forecasting.**—*C.E.P.B.*

5F–76 551.509.312

Sawyer, John Stanley and Bushby, F. H., **A baroclinic model atmosphere suitable for numerical ategration.** *Great Britain. Meteorological Research Committee, MRP* 715, Feb. 27, 1952. 10 p. 1 refs., 31 eqs. **DWB**—Authors adopt as a model a baroclinic fluid in which the thermal wind is onstant in any vertical column and has a speed proportional to the vertical pressure difference rough the layer. With certain assumptions, a system of 3 simultaneous differential equations is erived to compute the rates of change of height of a contour surface, thickness 1000 mb to that rface, and average vertical velocity throughout the column. A method of solution is given but to recast values 24 hours ahead would be very laborious without electronic computing machinery. (*Same item as* 3.10–76, Oct. 1952, *MAB.*) *Subject Headings:* **1. Baroclinic models 2. Height endency computation 3. Numerical forecasting 4. Thickness tendency computation.**—*C.E.P.B.*

5F–77 551.509.312

Sherman, Leon, **A numerical forecasting investigation. Part I.: Theory.** Florida. State Univ. Dept. of Meteorology, Contract NONR-158(00), [unnumbered] Technical Report, Jan. 15, **1952.** 9 p. refs., 20 eqs. **DWB**—This paper considers the problem of a single stage numerical forecast f the wind field. The particular forecast method used is based upon the solar vorticity equation, which provides a means of computing the vorticity tendency, and upon an analogous equation which provides a means of computing the horizontal divergence tendency. . . . Techniques for the estimate f the magnitudes of each of various sources of error have been set up and work is in progress to ccomplish these estimates. (*Same item as* 4.11–77, Nov. 1953, *MAB.*) *Subject Headings:* **1. Vorticity equations 2. Numerical forecasting 3. Wind forecasting. I. Florida State University. Dept. of Meteorology II. Contract NONR-158(00).**—*Author's abstract.*

5F–78 551.509.312:551.511:551.543

Stockholm. University. Institute of Meteorology, **Preliminary report on the prognostic value of barotropic models in the forecasting of 500 mb height changes.** *Tellus,* 4(1):21–30, Feb. **1952.** 2 tables, 6 refs. **MH-BH**—Efforts to improve the two-dimensional barotropic model for forecasting with high speed computers, must precede attempts to develop a 3-dimensional model (considering the vorticity equation). Considerable smoothing results from the 3 differentiations of the initial contour field but that doesn't matter because two integrations are performed, thus eliminating inaccuracies and random errors. Computed and actual tendencies for test area (NW Europe and N Atlantic) gave average correlation of 0.7 with best correlation (0.92) over Scotland and 0.6 where aerological reports are wanting (near boundaries of area). Results encourage use of conservation of vorticity as prime factor in producing pressure changes over short periods in broad regions. (*Same item as* 4.3–80, March 1953, *MAB.*) *Subject Headings:* **1. Numerical forecasting 2. Barotropic models 3. Pressure change charts 4. Northwestern Europe. I. Charney, Jule G.**—*M.R.*

5F–79 551.509.312

Syoono, S.; Sasaki, Y.; Koide, A. and Gambo, K. (*Geophys. Inst., Tokyo Univ.*), **On numerical prediction (I, II, III).** *Meteorological Society of Japan, Journal, 2nd Ser.*, Pt. I, 28(3):77–99, March **1950;** Pt. II, III, 30(8,9):264–271, 273–280, Aug., Sept. **1952.** figs., refs., eqs. **DWB**—In Pt. I, authors develop a numerical system for predicting the future variation of any quantity, knowing the existing state at any instant and the laws that govern its variation at that instant. Method is applied to pressure waves in one dimension, exemplified by variations of the upper westerlies and 1–2 day forecasting of their components. In Pts. II and III, some inaccuracies existing in the method developed in Pt. I are corrected by increasing the number of terms in the Fourier series. The new formulas are tested with good results against the spectral function of the height profile of the 500 mb surface. The results are compared with those obtained by applying CHARNEY's method (Pt. II). Spatial and time correlation coefficients of changes in pressure patterns are then analyzed by means of double Fourier series and predicted pressure patterns are obtained by a synthesis of each component. Numerical examples of the application of the elaborate method are offered (Pt. III). (*Same item as* 2.4–31, April 1951 and 4.10–74, Oct. 1953, *MAB.*) *Subject Headings:* **1. Numerical forecasting 2. Height tendency computation.**—*C.E.P.B., G.T.*

5F–80 551.509.312:551.515

†Thompson, Philip D. (*U. S. Air Force*), **Notes on the theory of large-scale disturbances in atmospheric flow with applications to numerical weather prediction.** *U. S. Air Force. Cambridge Research Center, Geophysical Research Papers,* No. 16, July **1952.** 106 p. 9 figs., bibliog. p. 105–106,

eqs. **DWB**—The problem of predicting the behavior of large-scale disturbances in the mean ho zontal flow of the earth's atmosphere, which is directly connected with the problem of predicting t day-to-day changes of surface weather conditions, has been studied from the standpoint of formul ing and solving the hydrodynamical equations which govern the flow. Owing to the difficulty solving the complete system of equations (whose very generality implies the existence of seve irrelevant, but possible, types of solutions), it is convenient to develop a "scale theory" whereby t various possible types of atmospheric motion, each corresponding to a distinct type of solution, can distinguished and classified. As it turns out, each type of motion is characterized by its phase spe and frequency. The large-scale disturbances, for example, are distinguished from all other typ of motion by a characteristic phase speed which is much less than that of sound waves and of hig speed internal gravity waves. By explicitly introducing this information into a mean vortici equation for adiabatic flow, it is then possible to reduce the system to a single equation from whi the extraneous solutions have been excluded and which is otherwise free of major difficulties. T resulting "prognostic equation," which governs the large-scale motions of a fictitious two-dimensio atmosphere, forms the basis for a method of numerical prediction. An iterative scheme, based on t solutions of a succession of linear equations, has been proposed for solving the nonlinear prognos equation. In the course of developing this method, the complete solutions for forced oscillatio induced by irregular terrain and for linear transient disturbances have been presented in readi computable form, in terms of known initial values and the appropriate Green's function. Final the prediction formulas for large scale transient disturbances have been applied to observed init data, with generally favorable results. (*Same item as* 4.10–75, Oct. 1953, *MAB.*) *Subject Headin* **1. Differential kinematics 2. Numerical forecasting 3. Atmospheric disturbances 4. Barotro models.**—*Author's abstract.*

1953

5F–81 551.509.312:551.5

Arnason, G. (*Univ. of Stockholm*), **A baroclinic model of the atmosphere applicable to problem of numerical forecasting in three dimensions. Pt. I,** *Tellus*, 4(4):356–373, Nov. 19 6 figs., 7 tables, refs. **Pt. II.** *Ibid.*, 5(3):386–402, Aug. **1953.** 14 figs., tables, 6 refs. **DWB** Author develops a three-dimensional baroclinic model of the atmosphere which is determined four parameters, three of which specify the field of temperature. This model allows for a nonunifo temperature lapse rate in the horizontal and takes into account the observed division of the atm sphere into a troposphere and stratosphere. The number of parameters is reduced to three utilizing the fact that the horizontal temperature gradient is usually reversed when traversing tropopause. This model is used to integrate the vorticity equation along the vertical. Examinat of the coefficients of the resulting two-dimensional equation indicates that in middle latitudes level of mean wind may vary from 2.5–6.5 km and that the level of nondivergence is always hig than the former. On the average, the level of mean wind lies below and the level of nondiverge above the 500 mb surface. The consequences of this for numerical forecasting are discussed. Pt. II, a theory for the application to numerical forecasting of the 3-parameter model of the tro sphere is developed and then tested on one synoptic case, Nov. 24, 1951, at 03Z, over western Eur and the eastern Atlantic. An essential feature of this model, beyond other models so far introduc is that the static stability may vary arbitrarily in a horizontal direction and with time as well. T implies a thermal wind which may change direction with height, and it is shown that this m parallelism of the isotherms in the vertical is important from the standpoint of thermodynam Furthermore, it is shown that the rotation of the thermal wind with height is closely connected w cyclogenesis and the deepening and filling of existing cyclones. Tendencies for sea level press and for the two parameters defining the tropospheric temperature distribution with height compu for the test case compared fairly well with observed changes. (Pt. I *same item as* 5.1–120, Jan. 1 *MAB.*) *Subject Headings:* **1. Numerical forecasting 2. Baroclinic models 3. Height tende computation 4. Thermodynamics of the atmosphere.**—*From author's abstract.*

5F–82 551.509.312:551.

Bolin, Bert (*Stockholm Univ.*), **Multiple-parameter models of the atmosphere for numer forecasting purposes.** *Tellus*, 5(2):207–218, May **1953.** 9 figs., 2 tables, 9 refs., 32 eqs. **MH-B** A general discussion of multiple parameter models of the atmosphere for forecasting purpose given and various ways of arriving at such models are presented. For some two-parameter mo it is possible to derive a simple graphical method of integration which may be used before high-s electronic computers are available. A numerical example is given. Finally, the accuracy of a t parameter representation is investigated more closely and a comparison is made with the accu of the radiosonde data. The conclusion is reached that a two-parameter model is adequate representing the field of pressure-heights with an accuracy which is only slightly less than the accu of the radiosonde observations themselves. Hence, models of three or more parameters ar interest merely to the extent that they are capable of describing in a more satisfactory manner

rocesses of the atmosphere. (*Same item as* 5.3–92, March 1954, *MAB.*) *Subject Headings:* **Numerical forecasting 2. Baroclinic models 3. Integration techniques 4. Graphical methods.** *-Author's abstract.*

5F–83 551.509.312:681.14

Bushby, F. H. and Hinds, Mavis K., **Computation of the field of atmospheric development by an electronic computer.** *Great Britain. Meteorological Research Committee, M.R.P.* 765, Jan. 8, **1953.** p. 23 figs., table, 9 refs., 3 eqs. Mimeo. See also: *Meteorological Magazine*, London, 82(977): 330–334, Nov. **1953. DWB**—A method of evaluating the Sutcliffe development formula for relative divergence between two pressure levels, using a grid (length 160 miles) and a reiterative process on an electronic computer "Leo," is described. It was applied to 12 synoptic charts for N. Atlantic and W. Europe (surface isobars and 1000–500 mb thickness), total time 1 hour each. The computed developments are analyzed. The method is a promising forecast aid. (*Same item as* 5.2–74, Feb. 1954, *MAB.*) *Subject Headings:* **1. Numerical forecasting 2. Electronic computers 3. Development theory 4. Grid size.**—*C.E.P.B.*

5F–84 551.509.312:681.14

Bushby, F. H. and Hinds, Mavis K., **Computation of the 500 mb height tendency in a baroclinic atmosphere, using an electronic computer.** *Great Britain. Meteorological Research Committee, M.R.P.* 790, March 24, **1953.** 9 p. 3 figs., 5 tables, 5 refs., 3 eqs. Mimeo. Also: **Computation of the 1000–500 mb thickness tendency, the 1000 mb height tendency, and the horizontal field of vertical motion, using an electronic computer.** *Ibid.*, 794, March 25, **1953.** 8 p. 3 figs., tables, refs., 7 eqs. Mimeo. (*See also* M.R.P. 682, 1951. 8 p.) **DWB**—In M.R.P. 794, referring to the baroclinic model of Sawyer and Bushby (5F–76 above), authors reduce the equations to a form suitable for use with an electronic computer. These were used first (M.R.P. 790) to compute height tendency of the 500 mb field over a grid centered on the British Isles for 3 synoptic situations, and later (M.R.P. 794) to compute base height and thickness changes in ft/hr and vertical motion fields. Computing times were 12 and 15 minutes and results were satisfactory, the chief difficulty being boundary conditions. (*Same item as* 5.2–75, Feb. 1954, *MAB.*) *Subject Headings:* **1. Numerical forecasting 2. Electronic computers 3. Height tendency computation 4. Baroclinic models 5. Thickness tendency computation.**—*C.E.P.B.*

5F–85 551.509.312

†Charney, Jule G. and Phillips, Norman A., **Numerical integration of the quasi-geostrophic equations for barotropic and simple baroclinic flows.** *Journal of Meteorology*, 10(2):71–99, April **1953.** 16 figs., table, 26 refs., 132 eqs. **MH-BH**—The numerical prediction of large-scale quasi-geostrophic motion is extended from 2 dimensions to motion in terms of 2 dependent variables along each vertical ("$2\frac{1}{2}$ dimensional model"). The equations are set out and a scheme of numerical calculation with an electronic computer described, using a 169 point grid over Eastern N. America. Examples of barotropic and $2\frac{1}{2}$ dimensional 12 and 24 hr forecasts of 500 and 700 mb levels are shown for Nov. 23–26, 1950, a period of unusually rapid baroclinic development. The $2\frac{1}{2}$ dimensional forecasts were consistently superior. Errors are attributed to low-level thermal assymetries and to the crudity of using only 2 parameters for vertical structure. A machine computation scheme is proposed using the general 3-dimensional equations. (*Same item as* 4.10–70, Oct. 1953, *MAB.*) *Subject Headings:* **1. Numerical forecasting 2. Barotropic models 3. Baroclinic models 4. Grid size 5. Electronic computers.**—*C.E.P.B.*

5F–86 551.509.317

Clapp, Philip F. (*U. S. Weather Bureau, Wash.*), **Application of barotropic tendency equation to medium range forecasting.** *Tellus*, 5(1):80–94, Feb. **1953.** 8 figs., table, refs. p. 93–94, 9 eqs. **MH-BH**—The simple barotropic vorticity equation has been used to compute height tendencies on a few 5-day mean 500 mb charts. The results are approximately as good as similar computations made on synoptic flow patterns despite the fact that the time interval between observed charts is 5 times as great. The order of magnitude of the computed tendencies may be considerably improved provided some account is taken of the effects of transformation of potential into kinetic energy, surface friction and non-adiabatic heating. A first approximation to these factors may be obtained by setting them equal to their climatological or normal values. A simple method for integrating the barotropic equation is derived upon assuming that the anomalies of the large-scale flow patterns may be approximated by a relatively small number of Rankine vortices. (*Same item as* 4.11–80, Nov. 1954, *MAB.*) *Subject Headings:* **1. Extended forecasting 2. Vorticity equations 3. Height tendency computation 4. Integration techniques.**—*Author's abstract.*

5F–87 551.509.312

de Lisle, J. F., **Numerical weather forecasting.** *Science Progress*, 163:454–464, July **1953.** 16 refs., 8 eqs. **DWB**—The problems of formulating equations to describe the motion of the atmos-

phere are set out. Pressure, density and 3 Cartesian coordinates are included in 5 equations b the vertical velocity must be computed indirectly. A series of atmospheric models are describ leading to successive approximations to the real atmosphere. It is concluded that general surfa weather forecasts will become practicable but local topographic effects must be dealt with by tra tional methods. (*Same item as* 4.11–75, Nov. 1953, *MAB.*) *Subject Headings:* **1. Numeri forecasting 2. Progress in meteorology.**—*C.E.P.B.*

5F–88 551.509.312:681.1

Electronic weather forecaster. *Current Science*, Bangalore, 22(2):38, Feb. **1953. DLC**—T fastest calculating machine built to date is located at the Institute for Advanced Study, Princet N. J. It is nicknamed "Maniac" and has a 2000 radio tube brain specialized on weather forecasti The equations devised for "Maniac" comprise the whole atmosphere up to 12 miles. (*Same item* 5.3–95, March 1954, *MAB.*) *Subject Headings:* **1. Electronic computers 2. Numerical forecasti** —*W.N.*

5F–89 551.501.7:551.509.3

Eliassen, Arnt, **On the demands upon the aerological network from the viewpoint of numeri forecasting.** Abstract in: *Geophysica*, Helsinki, 4(3):144, **1953.** Original unchecked. (Pa written for the session of the WMO (Aerological Commission, Aug. 1953.) **DWB**—Author poi out the need for a denser Northern Hemisphere network of radiosonde stations (<300 km apart) reduce the random errors involved in defining the contour fields in sufficient detail for the use numerical methods in forecasting. Aerological networks must be vastly improved over the oce and must be initiated in the Southern Hemisphere. Discussion by PALMÉN, SCHERHAG, BO NEWTON, NYBERG and FULKS. *Subject Headings:* **1. Numerical forecasting 2. Radiosonde n works.**—*M.P.K.*

5F–90 551.509.312:551.

Eliassen, Arnt, **A test of the two-parameter model of the atmosphere.** *Norske Videnska Akademi i Oslo. Institutt for Vaer-og Klimaforskning, Report*, No. 2, **1953.** 15 p. 9 figs., ta 5 refs. **DWB**—Tests of the 2 parameter model were carried out at the Institute for Research Weather and Climate at Oslo by the author with the aid of A. BELMONT of UCLA and B. MOEHL. The tests show that when 500 mb height and 1000–500 mb thickness are used as two basic paramet the last term of the forecast equation which involves the vertical transport of vorticity and divergence is fictitious and should be neglected as it gives exaggerated pressure falls in the cente cyclones. In an example of height tendency at 500 mb for the North Atlantic, omitting this term gave better results than omitting the last 2 terms (barotropic model). *Subject Headi* **1. Numerical forecasting 2. Baroclinic models 3. Height tendency computation.**—*M.R.*

5F–91 551.513.1:551.509.

Eliassen, Arnt and Hubert, W. E. (*Stockholm Univ.*), **Computations of vertical motion vorticity budget in a blocking situation.** *Tellus*, 5(2):196–206, May **1953.** 12 figs., 9 refs., 18 **MH-BH**—The synoptic situation under study is a blocking situation over Western Europe and Northeast Atlantic. Barotropic tendency computations for the 500 mb surface are carried out compared with the 12 hour observed height change. Tendency computations are also carried for the mean height (averaged along the vertical with respect to pressure). The vertical mo compatible with the observed local vorticity changes is computed from the vorticity equatio several levels. The result is in fair agreement with the observed distribution of precipitation cloudiness. The computations indicate that horizontal divergence and horizontal vorticity advec are of about equal importance in the vorticity budget at 500 mb, whereas the vertical vorti transport seems to be less important. (*Same item as* 5.2–107, Feb. 1954, *MAB.*) *Subject Headi* **1. Blocking action 2. Vertical motion 3. Vorticity balance 4. Height tendency computa 5. Numerical forecasting.**—*Authors' abstract.*

5F–92 551.509

Gates, W. Lawrence, **A method of numerical forecasting by juxtaposition of one-dimensi solutions, and its application to the equivalent barotropic model.** *Journal of Meteorology*, 10(2): 159, April **1953.** 5 figs., 8 tables, 9 refs., 4 eqs. **MH-BH**—Large-scale disturbances behave m as if they are embedded in a zonal current, and for short periods may be regarded as one-dimensi This is applied to the equivalent barotropic model of CHARNEY and ELIASSEN, and a metho numerical evaluation is described by which values can be calculated for different latitudes combined. Working tables are given. A 24-hour forecast using a 10° grid can be worked ou 60–90 min. Examples of forecast changes of 500 mb contours compare well with synoptic forec and it is suggested that this objective method could usefully supplement the latter. (*Same ite* 4.10–72, Oct. 1953, *MAB.*) *Subject Headings:* **1. Numerical forecasting 2. Barotropic mo 3. Grid size 4. Height tendency computation.**—*C.E.P.B.*

5F–93 551.509.312:681.14

Gião, Antonio and Raymond, F.-H., **Un calculateur électronique analogique pour la prévision mathématique du temps.** [An analogue type electronic computer for numerical forecasting.] *Geofisica Pura e Applicata*, 25:141–202, 1953. 13 figs., 6 refs., 191 eqs. **DWB**—The first part of the paper is devoted to the theory of the partial differential equation which is the mathematical foundation of the computer, as well as to the deduction of its general solution. The basic equations of the hydrodynamical theory of perturbations are first derived, then associated with the equations of motion and continuity, thus giving the fundamental system of the equations of the atmospheric perturbations. A new form of the kinematical conditions on the sea level surface is then derived and applied to give the final equation of the pressure variations. This equation, with its advective and development terms, has two horizontal vectorial coefficients, one an advection vector and the other a horizontal vector. The equation can also be derived from the hydrodynamical perturbation theory. The second part of the paper shows that the solution of the mathematical operations appearing in the expression of this equation can be rapidly and simultaneously performed by electronic means, thus leading to the construction of an analogue computer for short and long range numerical weather forecasting. (*See also* 5F–109 below.) *Subject Headings:* **1. Numerical forecasting 2. Electronic computers.**—*From author's summary.*

5F–94 551.509.312:551.511

†Hinkelmann, Karl, **Quantitative Verfahren zur Voraussage atmosphärischer Zustandsänderungen.** [Quantitative method for forecasting atmospheric changes of state.] *Berlin. Freie Universität. Institut für Meteorologie und Geophysik, Meteorologische Abhandlungen*, 2(2), **1953.** 58 p. numerous eqs., 19 refs. **DWB**—The author maintains that the problem of numerical forecasting (with aid of electronic calculators) must be attacked in two steps: (a) the creation of a physically sound model of the general or monsoonal circulation which will change only slowly with the seasonal variations in radiation balance, and (b) starting with a given initial condition, the calculation by progressive integration of the hydrodynamic equation, of future weather conditions over given area. Changes in initial conditions must be accounted for by starting over (or by some adjustment). In the 13 chapters of this monograph the author discusses practically and theoretically the many aspects of the problem which are necessary to develop such a program—from the often forgotten point that pressure and temperature at any level (as obtained from radiosonde ascents) are not independent parameters since temperature is used in calculating pressure, to the problem of grids, wind fields, iterative methods of calculating pressure tendency, non-linear differential equations and technical aids. *Subject Headings:* **1. Numerical forecasting 2. Hydrodynamic equations 3. Height tendency computation.**—*M.R.*

5F–95 551.509.312

†Hinkelmann, Karl (*Deutscher Wetterdienst, Bad Kissingen*), **Zur numerischen Wettervorhersage mittels Relaxionsmethode unter Einbeziehung barokliner Effekte. I & II.** [Numerical forecasting by means of relaxations method taking into account the baroclinic effect. I & II.] *Tellus*, 5(3,4): 251–259; 499–512, Aug., Nov. **1953.** 25 figs., refs., eqs. **DWB**—Following a publication in *Berichte des Deutschen Wetterdienstes* No. 38, p. 416 (5F–65 above), the present paper outlines a method for the approximate solution of the quasistatistical and quasigeostrophical basic equations in an arbitrary baroclinic atmosphere taking into consideration the normal boundary conditions. Certain influence functions are calculated for a standard atmosphere by means of a relaxation method. In these calculations it is assumed that the inhomogeneous term of the differential equation is equal to unity at one grid point and disappears at all the others. The solutions permit us to determine the reaction of the atmosphere to a point source perturbation and to calculate its horizontal and vertical range. *Subject Headings:* **1. Numerical forecasting 2. Baroclinic models.**—*Author's abstract.*

5F–96 518.82

Householder, Alston S., **Principles of numerical analysis.** New York, London, McGraw-Hill, **1953.** 274 p. figs., refs., eqs., tables. Abstract by E. C. Nelson in: *Science*, 119(3095):547–548, April 23, **1954. DLC**—A textbook devoted to the mathematical aspect of numerical analysis. Subjects treated include computation, errors in calculation, linear algebraic equations, differential and integral equations, non-linear equations, eigenvalue problems, interpolation, numerical integration, differentiation and the Monte-Carlo method. The use of electronic digital computers is not discussed. *Subject Headings:* **1. Textbooks 2. Mathematical techniques. I. Nelson, E. C.**—*M.P.K.*

5F–97 551.509.312

Joern, John G. and Sherman, Leon, **A numerical forecasting investigation using the equation of motion.** Florida. State Univ., Tallahassee, Dept. of Meteorology. ONR Project NR 082 071, Contract NONR-988(01), [unnumbered] Technical Report, Aug. 1, **1953.** 24 p. 16 figs., eqs. **DWB**—The equation of motion is written in quasi-natural coordinates, the tangential and normal

components of which represent tendency equations for wind speed and direction respectively. A attempt to determine the magnitudes of the controlling terms and to evaluate their instantaneou derivatives by means of a graphical method in order to determine the local time rate of change c the wind showed largely negative results. Failure of present analysis technique is due in large pa to its inability to measure contributions due to vertical advection. Well illustrated with streamlin and contour maps. *Subject Headings:* **1. Numerical forecasting 2. Upper air wind forecastin 3. Equations of motion 4. Graphical methods. I. Florida. State University. Dept. of Meteo ology II. ONR Project NR082071 III. Contract NONR-988(01).**—*From authors' abstract.*

5F–98 551.509.312:681.1

[Official announcement of plans for the first day-by-day use of an electronic computer in a tri run on weather forecasting is expected in 1954.] *Science*, 118(3074):644–645, Nov. 27, 195 **DWB**—Interesting popular description of what numerical forecasting actually is, how it entails th use of electronic computers and in what ways the machine-computed 24-hr upper wind forecas will serve to assist the local forecaster in his more subjective forecasts. *Subject Headings:* **1. Nume ical forecasting 2. Electronic computers 3. Upper air wind forecasts.**—*M.P.K.*

5F–99 551.509.312:5

Pedersen, Kåre, **Application of Fjørtoft's graphical method for preparing prognostic 500 mb map** *Norske Videnskaps Akademi i Oslo. Institutt for Vaer-og Klimaforsking, Report*, No. 4, 1953. 9 5 tables, 6 figs., 3 refs. **DWB**—A series of sixteen 24 hr prognostic 500 mb maps (April 1–5, 195 July 1–6, 1951; Jan. 2–6, 1952, a period of very strong changes in 500 mb flow) were constructe utilizing FJØRTOFT's (*see* 5F–61) graphical method (using $d = 650$ km in constructing space mea fields). Method did not give much indication of changes in intensity of the pressure systems th actually occurred. Forecast positions of areas of rising pressure were much better than those falling pressure (Jan. and April). Forecast position of large cyclones was generally found to the le of the actual track (especially for deepening cyclones), and there were indications that large foreca errors occur when the geostrophic temperature advection is strong. Level of nondivergence seem lower in January and April than in July. Discussion by PALMÉN and SCHERHAG. *Subject Heading* **1. Prognostic charts 2. Graphical methods 3. Numerical forecasting 4. Barotropic mode I. Palmén, E. II. Scherhag, R.**—*From author's abstract.*

5F–100 551.507:551.543

*Silberman, Isadore, **A matrix method for computing atmospheric oscillations.** New Yo University. College of Engineering. Research Div., Contract AF 19(122)-49, Scientific Repo No. 3, Jan. **1953.** 13 p. 6 tables, 6 refs., eqs. **DWB**—A matrix method is presented for calculati the horizontal variation of the modes of free atmospheric oscillations when the period is give Numerical examples are given for a period equal to half a lunar day. The method is shown to particularly useful for calculating the modes of oscillation for a period which differs by a few minu from another period whose modes have already been calculated. It is much simpler than an extensi of the approximation method for zonally symmetrical oscillations (HAURWITZ and SAWADA, 19 to the non-symmetrical case. *Subject Headings:* **1. Numerical forecasting 2. Atmospheric oscil tions. I. New York Univ. College of Engineering. Research Div. II. Contract AF 19(122)-49.** *Author's abstract.*

5F–101 551.511:551.509.3

Smebye, Sigurd J. (*Stockholm Univ. and Norske Met. Inst.*), **Tendency computations with continuous two-parametric atmospheric model.** *Tellus*, 5(2):219–223, May **1953.** 6 figs., re **MH-BH**—In a case of strong development the tendencies at the 500 and 1000 mb surfaces computed with a two parametric model. It is possible to take the thermal structure of the atm sphere into account in a crude manner by expressing the vertical temperature distribution as a funct of the deviation of the 1000–500 mb thickness from a standard value. The height of the 500 surface and the 1000–500 mb thickness are used as variables. The tendencies are computed for t maps 12 hrs apart, the intermediate tendencies interpolated for every 2 hrs and then the 12 hr cha of the 1000 and 500 mb surfaces are computed. The tendencies computed represent an improvem over those computed with the barotropic model, but the 12 hr changes are still only about $\frac{2}{3}$ of observed changes. (*Same item as* 5.3–139, March 1954, *MAB.*) *Subject Headings:* **1. Hei tendency computation 2. Numerical forecasting 3. Baroclinic models 4. Thermodynamics of atmosphere.**—*Author's abstract.*

5F–102 551.509.312:551.

Stümke, H., **Differentialgleichungen der quasigeostrophischen Weiterentwicklung von Dru feldern mit schwachen, mittleren und starken Windgradienten in der Erdatmosphäre und ähnlich rotierenden Systemen.** [Differential equations of quasigeostrophic development of pressure fie

ith weak, moderate and intensive wind gradients in the earth's atmosphere and similar rotating ystems.] *Germany. Deutscher Wetterdienst, Berichte*, No. 3, **1953.** 19 p. 2 tables, eqs. **DWB**—useful systematic summary of the order of magnitude of meteorological fields is compiled in a oncise form, applicable to the atmosphere of the earth and other planets, to oceans and model xperiments under varying conditions, distinguishing between important and negligible terms. he development of pressure fields is analyzed for a rotating disk, disregarding the curvature of the arth, nonadiabatic processes and friction and limiting the discussion to latitudes above 30°. An erative procedure is proposed in order to avoid the difficulty afforded by the quasigeostrophic pproach's being only a rough approximation. The methods of solution depend largely on the order f magnitude of the wind gradient. *Subject Headings:* **1. Dynamic meteorology 2. Pressure fields . Numerical forecasting.**—*A.A.*

5F–103 551.511:551.515

†Thompson, P. D., **On the theory of large-scale disturbances in a two-dimensional baroclinic quivalent of the atmosphere.** *Royal Meteorological Society, Quarterly Journal*, 79(339):51–69, Jan. **953.** 3 figs., 19 refs., 22 eqs. **DWB**—With numerical forecasting in mind, author formulates quations of "equivalent-baroclinic" 2-dimensional flow involving only temperature and height of sobaric surface. "Since those equations form a closed system, they constitute a mathematically omplete theory of the development and movement of large-scale disturbances at the level of equiva- ence" once they are initiated (but not for the initiation of new disturbances). An iterative scheme s proposed which may provide a basis for a new technique of numerical forecasting. Discussion by UTCLIFFE, MILES, FORSDYKE, BUSHBY and author in *Quarterly Journal* 80(343):108–109, Jan. 1954. *Same item as* 4.7–72 in July 1953, *MAB.*) *Subject Headings:* **1. Dynamics of the atmosphere . Atmospheric disturbances 3. Baroclinic models 4. Iterative methods.**—*C.E.P.B.*

5F–104 551.509.312:681.14

Weather by giant "brain." *Science News Letter*, 64(20):309, Nov. 14, **1953.** illus. **DWB**—eference is made to statements by "the nation's top weather experts in Washington," expected to e followed by an official announcement in 1954, of the first trial run (under a joint Navy-Air Force-Weather Bureau program) of an electronic computer for weather forecasting purposes. According o the plan the computer (developed at the Institute for Advanced Study, Princeton, N. J.) will be ed nation-wide pressure data from several altitudes (to 30,000 ft) from which it will compute hour- y-hour expected data on winds, adding these up to 24-hour forecasts in less than an hour. The ind forecasts will be distributed in chart form on a national scale. *Subject Headings:* **1. Numerical orecasting 2. Electronic computers 3. Upper air wind forecasting.**—*G.T.*

5F–105 551.509.312

Wippermann, F., **Der Einfluss des verwendeten Zeitschrittes auf die Güte numerischer Prog- nosen für den Fall divergenzfreier Strömungen.** [The influence of the adopted time interval on the ccuracy of numerical forecasts for the case of non-divergent currents.] *Meteorologische Rundschau*, (9/10):180–182, Sept./Oct. **1953.** fig., 20 eqs. **DWB**—In numerical forecasting finite steps of istance and time must be used. The actual changes of a pressure field, determined by solving Neamtan's non-linear vorticity equation are compared with those given by linear interpolations of he pressure field over n finite time intervals using exact tendencies. The correlation between the two depends on the number and magnitude of the time intervals and the rate of development. Even in rapid development the error of a 24-hr forecast based on 4-hr steps may be less than 2%. *Subject Headings:* **1. Numerical forecasting 2. Pressure fields.**—*C.E.P.B.*

1954

5F–106 551.509.312(04)

American Meteorological Society. District of Columbia Branch, **1954 workshop in numerical weather prediction.**—The addresses listed below were delivered as a lecture series at the workshop held at George Washington University in Washington, D. C., June 2–4, **1954,** under the auspices of the D. C. Chapter of the American Meteorological Society. CHARNEY, JULE (Inst. for Adv. Study, Princeton, N. J.), The theoretical basis of numerical weather prediction. GILCHRIST, BRUCE (Inst. for Adv. Study, Princeton, N. J.), Introduction to numerical methods. Computing machines and their uses. GILCHRIST, BRUCE and CRESSMAN, GEORGE P., Present research and future plans. SMAGORINSKY, J. (U. S. Weather Bureau), Objective analysis. The numerical prediction of precipitation. THOMPSON, P. D. (USAF, Cambridge Research Directorate), The barotropic model. Baroclinic effects. Pt. I and II. *Subject Headings:* **1. Numerical forecasting 2. Addresses. I. Charney, Jule II. Gilchrist, Bruce III. Cressman, George P. IV. Smagorinsky, J. V. Thompson, P. D.**

5F–107 551.509.312:681.1

Bushby, F. H. and Hinds, Mavis K., **Computation of tendencies and vertical motion with two-parameter model of the atmosphere.** *Royal Meteorological Society, Quarterly Journal,* 80(343) 16–25, Jan. **1954.** 4 figs., 2 tables, 11 refs., 9 eqs. **DWB**—Sawyer and Bushby derived a 2 dimensional model for forecasting 500 mb contour height h_m and 500–1000 mb thickness h'. Ele tronic computation of rates of change of h_m and h' and fields of vertical motion is described for synoptic situations. Results compared well with observed changes (correlation 0.5–0.95) and wi those expected from synoptic experience. Over a small area, effect of boundary conditions is i portant. *Subject Headings:* **1. Numerical forecasting 2. Electronic computers 3. Height tenden computation 4. Thickness tendency computation 5. Baroclinic models.**—*C.E.P.B.*

5F–108 551.509.312:551.515.

Charney, Jule G. (*Inst. for Advanced Study, Princeton*), **Numerical prediction of cyclogenes** *National Academy of Sciences, Proceedings,* 40(2):99–110, Feb. **1954.** 6 figs., 4 refs., eqs. **DWB** Author refers first to his and N. A. Phillips 1953 article (*see* 5F–85 above) in which they "devise sequence E_n of mathematical models of the atmosphere capable of predicting the geopotentials of suitably selected isobaric surfaces, and then presented the results of a series of consecutive 24- numerical integrations that had been carried out with the models E_1 and E_2 for an intensely cyc genetic situation," Nov. 23–25, 1950. Shortcomings of the one- and two-level models are quick reviewed. In this paper, Charney presents the results and discusses the implications of the fi purely mathematical prediction of cyclogenesis in which numerical integrations with a three-le model, E_3, were used. A description of the model is given (levels being 200, 500 and 850 mb or 4 700 and 900 mb) and the method of solving the prediction equation explained. Figures illustrate t accuracy with which cyclogenesis and development were predicted by the one-, two- and three-le models. Correlation coefficients between predicted and observed 24 hr height changes plotted a function of the initial time for the period Nov. 23–24, 1950 were high (.85–.90) for all three predictio (one-level at 500 mb; two-level at 700 mb; three-level at 500 mb) during the period preceding storm but remained high (.80–.90) for only the three-level model. The encouraging degree forecast accuracy attained with the three-level model warranted a second test series of predictio using a more typical, less intense case of development on the U. S. east coast. "Again cyclogene was predicted." Tentative conclusions drawn are: 1) "the conception of cyclogenesis as the grow of an effectively random perturbation in an unstable uniform field of flow must be abandoned 2) "motions which are essentially non-geostrophic need not be assumed for the explanation of cyc genesis;" 3) heat sources or sinks are not necessarily essential factors in extratropical cyclogene and 4) a model for predicting cyclogenesis "must somehow take into account the low-level therm asymmetries" and must therefore be at least three-level. *Subject Headings:* **1. Numerical forecast 2. Cyclogenesis forecasting 3. Barotropic models 4. Baroclinic models.**—*M.P.K.*

5F–109 551.509.312:681

Gião, Antonio and Raymond, F.-H., **Recherches complémentaires sur les bases du calculat météorologique "Temp."** [Complementary research on the bases of the meteorological compu "Temp."] *Geofisica Pura e Applicata,* 27:121–155, **1954.** 4 figs., 6 refs., 99 eqs. **DWB**— basic formula, expressing an analytical property of a very general class of functions, is a corollary the fundamental theorem, proved in a previous paper (*see* 5F–93 above), according to which, give function $p(\varphi, \lambda, t)$ of the points (φ, λ) of a closed regular surface σ and of the time, and a tran or advection velocity vector $\overrightarrow{H\sigma}(\varphi, \lambda)$ tangent to σ and having regular closed streamlines, there spatial, linear, non singular operator A such that $A(p+\text{const.})$ is a purely advective function respect to $\overrightarrow{H\sigma}$ (no deepening). Theorem can be expressed by $\varphi p/\varphi t = -\mathfrak{M}[\overrightarrow{H\sigma} \cdot \nabla p]$ where $\mathfrak{M}$ spatial, linear, non singular operator depending on A. The following problems are analyzed means of the basic formula: 1) deepening and filling in general; 2) deepening and filling of the cen and cols; 3) motion of the centers and cols; 4) instability of a mean field; and 5) spatial properti the analytical fields and advection vectors $\overrightarrow{H\sigma}$. The errors in the forecast of a field $p(\varphi, \lambda, t)$ means of the basic formula, due to observational and computational errors, are discussed, and s peculiarities of the transfer or advection of a field $f_0(\varphi, \lambda)$ by $H\sigma$ are examined. Finally, fur information is disclosed on the structure of the electronic computer "Temp." *Subject Headi* **1. Electronic computers 2. Numerical forecasting.**—*From authors' summary.*

5F–110 551.509

Smagorinsky, Joseph (*U. S. Weather Bureau*), **Data processing requirements for the purpose numerical weather prediction.** (In: Eastern Joint Computer Conference, Washington, D. C., 8–10, 1953, **Proceedings.** Papers and discussions presented at the joint IRE-AIEE-ACM comp conference, Pub. by the Institute of Radio Engineers, Inc., N. Y., **1954.** p. 22–30. 4 figs., 9 r **DWB**—The physical background and historical development of numerical weather predictio

mmarized. The nature of the mathematical problem and the work-load for a digital computer are en described. The existing system of processing meteorological information (particularly upper r data) for operational weather prediction is examined in the light of the anticipated needs for erational numerical weather prediction. The critique exposes deficiencies which may be intolerable r operational numerical weather prediction. Some suggestions are offered for revamping the isting system utilizing modern technological advances. Discussion by W. P. BYRNES and author. *ubject Headings:* **1. Numerical forecasting 2. Data processing. I. Byrnes, W. P.**—*Author's bstract.*

5F–111 551.558:551.578.45

Webber, John P. (*Blue Hill Observatory*), **Discussion of revised charts of vertical velocity, orm of January 7–8, 1951.** (In: Harvard University, Blue Hill Meteorological Observatory, ontract No. CWB-8310, Final Report, 1952–53, Feb. 19, **1954.** p. 1–9. 10 figs., 2 refs.) **DWB**—A series of revised charts of vertical velocity at 700 and 500 mb for the snowstorm of Jan. 7–8, 1951 Boston" is used to study the association between precipitation amount and extent and patterns nd magnitudes of vertical velocity. Agreement was closer in the semi-circle north of the Low nter than south of the center. Future plans for a similar study of the Jan. 8–11, 1953 Boston storm tail the determination of vertical velocities (and thence precipitation) from computation of relative orticity from the contours of the upper level charts using a spacing equal to 5° of latitude between e point (for which one is computing relative vorticity) and the four points N, E, S, and W of it stead of the $2\frac{1}{2}$° spacing used before. Reference is made to earlier work as reported in the Final eport on Contract CWB-8163, May 19, 1953 and the Semi-annual Progress Report on Contract WB-8310, Aug. 5, 1953. *Subject Headings:* **1. Vertical velocities 2. Snowfall distribution 3. orticity. I. Blue Hill Observatory II. Contract CWB-8310 III. Contract CWB-8163.**—*M.P.K.*

SUPPLEMENTARY MATERIAL

5F–112 551.509.33

Kibel', I. S., **Prilozhenie k meteorologiĭ uravnenii mekhaniki baroklinnoi zhidkosti.** [Applicaon to meteorology of equations for the mechanics of baroclinic fluids.] *Akademiia Nauk SSSR, vestiia, Ser. Geograf. i Geofiz.*, No. 5:627–638, **1940.** 3 figs., 22 eqs. French summary p. 637–638. **LC**—A classic attempt to apply the equations of motion for a baroclinic atmosphere to the problem forecasting pressure for the North Atlantic and European sector of the Northern Hemisphere. model is set up as a first approximation, using 3 coordinates (x, y & z), 3 components of wind (u, v & w), pressure (p), density (ρ), the vertical component of the angular velocity of earth's rotaon (ω_z), coefficient of turbulent viscosity (μ), acceleration gravity (g) and time (t). The equation continuity and equation of energy flux are also incorporated. The boundary limits are the earth's rface and the tropopause. The problem is to determine the temperature, pressure and Stefanoltzmann constant for each coordinate with respect to time. An actual example is presented. loisture and resulting thermodynamic changes are not included, but it is suggested that the problem rain formation on a synoptic scale could be solved by an extension of the above method taking oisture into account. *Subject Headings:* **1. Numerical forecasting 2. Baroclinic models 3. Progostic charts 4. Kibel's method of forecasting.**—*M.R.*

5F–113 551.547:551.509.312

Elliott, Robert D. and Kerr, Raymond E., Jr., **Observed features of flow patterns aloft of articular interest to single station analysis and forecasting. A technical Progress report.** Aerophysics Research Foundation, Santa Barbara, Calif. Contract N189s-81138, Report 52-2, June 952. 13 p. plus 5 figs., 2 tables, 6 refs., 28 eqs. **DWB**—"Included in this report are the results f an actual count of wave length and velocity relationships as observed over North America and the tlantic Ocean." Isobar-isotherm relationships for various horizontal planes and for the vertical lane are discussed and illustrated. In pt. 2, a trial simplified numerical forecast procedure for the pper air pattern is described and evaluated. Using moving 7 and $2\frac{1}{2}$ day means of the 500 mb eight in combination with the geostrophic wind relationship, the wave velocities of the short ($2\frac{1}{2}$ ay period) and long (7 day period) waves can be computed for each 12 hr (or 6 hr) period. Success irly good for long waves but poor for short waves. *Subject Headings:* **1. Upper air flow patterns . Numerical forecasting 3. Height tendency computation 4. Single station forecasting. I. Aerophysics Research Foundation, Santa Barbara, Calif. II. Contract N189s-81138.**—*M.P.K.*

5F–114 551.509.312

Hollmann, G., **Die numerische Wettervorhersage.** [Numerical weather forecasting.] *Gerany. Deutscher Wetterdienst, Wetterkarte*, No. 250, Sept. 7, **1953.** Original unchecked. *Subject leading:* **1. Numerical forecasting.**

5F–115 551.509.3

Sutcliffe, R. C., **Dynamical methods of numerical forecasting.** Paper presented at the Wor Meteorological Organization, Commission for Aerology, First Session, Toronto, **1953.** Origin unchecked. *Subject Heading:* **1. Numerical forecasting.**

5F–116 551.509.3

Great Britain. Meteorological Office, **Dynamical forecasting by numerical methods.** *Meteor logical Magazine*, 83(984):175–182, June **1954.** 3 figs., 8 refs. **MH-BH**—F. H. Bushby open with a discussion of various atmospheric models as bases for computing future condition of t atmosphere. Actual charts of 500 mb contours and 1000–500 mb thickness are compared wi computed charts 24 hr ahead. The discussion is briefly summarized; it was considered that co siderable progress is being made. *Subject Headings:* **1. Numerical forecasting. I. F. H. Bushby.** *C.E.P.B.*

5F–117 551.5(02) 551.509.3

Riehl, Herbert, **Tropical meteorology.** New York, etc., McGraw-Hill, **1954.** 392 p. fig eqs., photos, refs. **DLC**—Pages 206–208 in the chapter on "Divergence and Vorticity" are devot to the discussion of a possible numerical method of forecasting vorticity and wind distribution a vorticity tendency in the tropics utilizing the concept of constant absolute vorticity trajector (CAVT). First forecasts will probably be based on a barotropic model but subsequent ones mig allow for the baroclinicity of the atmosphere by including divergence. Adjustment of numeri forecasting techniques to apply to low latitudes and a far denser observational network are necessa (For abstract of entire book, see subsequent issues of *MAB*). *Subject Headings:* **1. Numeri forecasting 2. Vorticity 3. Tropical meteorology.**—*M.P.K.*

5F–118 551.509.3

Scorer, Robert S. (*Imperial College, London*), **The use of normals in numerical forecasti** *Tellus*, 6(1):23–26, Feb. **1954.** ref., 10 eqs. **DWB**—If there exists, in the spectrum of fluctuati of weather, a period of relatively low amplitude, and if a set of normal values of the right kind be defined, then dynamical equations for the behaviour of the atmosphere can be used for the merical prediction of charts meaned over the period of low amplitude. *Subject Headings:* **1. I merical forecasting 2. Statistical techniques.**—*Author's abstract.*

5F–119 551.509.

Prandtl, L., **Zur Berechnung des Wetterablaufs.** [The calculation of weather developmen *Akademie der Wissenschaften zu Göttingen, Nachrichten, Math.-Phys. Klasse*, No. 2:102–105, 19 7 eqs. **DBS**—A numerical method is presented for determining the present and future press and velocity fields for slowly changing weather processes from density distribution at a given tim Tendency equation used and geostrophic approximation considered. *Subject Headings:* **1. Num ical forecasting 2. Pressure fields.**—*M.P.K.*

5F–120 551.509.312:551

Brandejs, Stanislav, **Rovnice atmosfericke dynamiky v p-systemu.** [Equations of atmosph dynamics in the p-system.] *Meteorologicke Zpravy*, 6(2):44–53, **1953.** 4 figs., refs., 88 eqs. **DL** An intensive and extensive treatment of the equations of motion and geostrophic gradient, the and ageostrophic components leading up to inclusion of equations of tendency of relative topogra advective tendency and vorticity, and their transformation to a form which can be used in nume calculations. The work is based on previous work of Fulks, Charney, Eliassen, Fjørt Scherhag, Sawyer and Sutcliffe. *Subject Headings:* **1. Numerical forecasting 2. Dyna of the atmosphere.**—*M.R.*

5F–121 551.5

Vitek, Vojtech, **Dynamicke predpovedni methody v synopticke meteorologii III. Kibe methoda.** [Dynamic weather forecasting methods in synoptic meteorology. III. Kibel's meth *Meteorologicke Zpravy*, 6(2):34–40, **1953.** 6 refs., 79 eqs. **DLC**—Detailed theoretical treatme equations used by Kibel' (1940) and Taborovksiĭ's application of Kibel's method to the baro model for 500–1000 mb level. (Kibel' integrated for a baroclinic layer from ground to tropopa The chief extensions which are mentioned are those of Izvekov and Taborovksiĭ in applyin theory of steering currents to Kibel's approximations, and later work of Pogosian and Tabor in applying Kibel's method to practical advective dynamic forecasting. *Subject Headings:* **1. Ki method of forecasting 2. Baroclinic models 3. Numerical forecasting.**—*M.R.*

PART III. METEOROLOGICAL ARTICLES APPEARING IN RECENTLY ISSUED PUBLICATIONS

Note: The contents of periodicals included in this section, are for information only, and will not be listed in the monthly indexes. When material is furnished in advance of date of publication the pagination may be omitted.

merican Meteorological Society, Bulletin, Volume 35, Number 3, March 1954.

Cox, Everett F, Plagge, H. J. and Reed, J. W.: **Meteorology directs where blast will strike,** p. 95–103.

Blanc, Milton L.: **Commission for Agricultural Meteorology, WMO, holds first session in Paris, November 1953,** p. 104.

Hall, Clifford D.: **Forecasting the lake breeze and its effects on visibility at Chicago Midway Airport,** p. 105–111.

Namias, Jerome: **Further aspects of month-to-month persistence in the mid-troposphere,** p. 112–117.

Brier, G. W.: **7-day periodicities in May, 1952,** p. 118–121.

Krumm, W. R.: **On the cause of downdrafts from dry thunderstorms over the plateau area of the United States,** p. 122–125.

Letters to the Editor

Dorsey, Herbert G., Jr.: **Outlooks for New England winters,** p. 129.

Showalter, A. K.: **Precipitable water template,** p. 129–131.

Endlich, Roy M.: **A note on pressure at the tropopause,** p. 131–132.

Brooks, Charles F.: **Indications for a mild winter in New England,** p. 132–133.

Hosler, C. L.: **The reliability of nucleus concentration as measured by an Aitken counter,** p. 133.

Munn, R. E.: **The measurement of snow depth,** p. 133–134.

Gilchrist, B. and Cressman, G. P.: **More efficient weather coding,** p. 134–135.

nnalen der Meteorologie, Hamburg, Volume 6, Number 1/2, 1953/1954.

Frankenberger, Ernst: **Sommerliche Mittagsprofile der potentiellen Temperatur, der spezifischen Feuchte, der thermischen Energie und der Windstärke an klaren Tagen über einem Schleswig-Holsteiner Wiesengelände bei verschiedenen Windstärken,** [Summer midday profiles of potential temperature, specific humidity, thermal energy and wind force on clear days over a Schleswig-Holstein meadow at different wind forces], p. 1–4.

Frankenberger, Ernst: **Messungen der natürlichen Verdunstung über Gras nach verschiedenen Methoden und einige Folgerungen betreffend atmosphärische Turbulenz und Konvektion,** [Measurements of natural evaporation over grass by different methods and some conclusions concerning atmospheric turbulence and convection], p. 5–13.

Kaps. Egon: **Die Temperaturverhältnisse an der Elbe zwischen Ufer und Deich,** [Temperature conditions on the Elbe between shore and dyke], p. 15–25.

Levert, Christoffel: **Die Schwierigkeiten bei der Auswertung der Aufzeichnungen beim Niederschlagsmesser des Waageprinzips infolge des besonderen Koordinatennetzes des Schreibstreifens,** [Difficulties in evaluating records of the weighing raingage because of the special coordinate system of the record sheet], p. 26–32.

Schiess, Josef: **Über eine Feuchteprüfanlage grosser Genauigkeit,** [On a moisture testing apparatus of great accuracy], p. 33–38.

Ringleb, Franz: **Niederschlags- und Trockenperioden in Westdeutschland (Am Beispiel der Stationen Aachen und Münster),** [Wet and dry periods in Western Germany (exemplified by Aachen and Munster)], p. 39–57.

Petri, O.: **Ein neuer Windrechner für Bordgebrauch,** [A new wind calculator for use on board], p. 57–60.

Annales de Géophysique, Paris, Volume 10, Number 1, January/March 1954.

Dufay, Jean and Tscheng, Mao-Lin: **Sur l'altitude d'émission de la raie verte du ciel nocturne,** [Altitude of the emission of the green ray of the night sky], p. 1–8.

Mériau, P. and Rawer, K.: **Observations ionosphériques durant l'éclipse du 25 février 19 effectuées à Djibouti (Somalie),** [Ionospheric observations at Djibouti (Somalilan during the eclipse of Feb. 25, 1952], p. 9–18.

Heé, Mme A.; Coche, A.; Keller, P.; Jarovoy, M. and Wack, Mlle M.: **Remarques sur constante de désintégration β du K^{40},** [Remarks on the disintegration constant of β K^{4} p. 19–40.

Robley, R.: **Remarques sur l'altitude de la couche de sodium responsable de l'émission cr pusculaire,** [Remarks on the height of the sodium layer responsible for twilight emission p. 41–46.

Rougerie, Paul: **Les baies géomagnétiques enregistrées à l'Observatoire du Val-Joyeu** [Geomagnetic bays recorded at Val-Joyeux Observatory], p. 47–58.

Le Grand, Yves; Lenoble, Jacqueline and Saint-Guily, Bernard: **Étude de la pénétration l'ultraviolet dans la mer,** [Study on the penetration of ultraviolet radiation into the sea p. 59–63.

Elnesr, M. K.: **Suppression de l'effet électrochimique dans les couples thermoélectriqu destinés aux mesures météorologiques,** [Suppression of the electrochemical effect in elect thermocouples intended for meteorological measurements], p. 64.

Gibault, G.: **Sur un décalage entre les micropulsations du magnétisme terrestre et les pe turbations ordinaires,** [On the difference between micropulsations of terrestrial magneti and ordinary perturbations], p. 65.

Mayaud, Pierre-Noël: **Sur la forme de la variation $S_a - S_q$ du champ magnétique dans l régions polaires,** [On the form of the variation $S_a - S_q$ of the magnetic field in polar region p. 89–92.

Archiv für Meteorologie, Geophysik und Bioklimatologie, Serie A, Vienna, Volume 6, Numb 3–4, 1954.

Defant, F.: **Über den Mechanismus der unperiodischen Schwankungen der allgemein Zirkulation der Nordhalbkugel,** [The mechanism of aperiodic oscillations of the gene circulation in the Northern Hemisphere], p. 253–279.

Defant, F.: **Über charakteristische Meridionalschnitte der Temperatur für High und L Index-Typen der allgemeinen Zirkulation und über die Temperaturänderungen währe ihrer Umwandlungsperioden,** [Characteristic meridional sections of temperature for H and Low Index-types of the general circulation and the temperature variations during transformation periods], p. 280–296.

Kletter, L.: **Über die Ursachen des Zerfalls stationärer Hochdrucklagen in Europa. Beispi echter Steuerung,** [The causes of deterioration of stationary high pressure situations Europe. Examples of close steering], p. 297–318.

Gordon, A. H. and Shaw, P. M.: **Application of particle dynamics to derive a general circulat in low latitudes,** p. 319–333.

Faust, H.: **Nullschichteffekt und Frontalzonen,** [Zero layer effect and frontal zones], p. 334–3

Brocks, K.: **Eine räumlich integrierende optische Methode für die Messung vertikaler Te peratur- und Wasserdampfgradienten in der untersten Atmosphäre,** [Space integrat optical method for measuring vertical temperature and water vapor gradients in the lo atmosphere], p. 370–402.

Čadež, M.: **Über einige Einflüsse orographischer Hindernisse auf die Luftbewegung,** [Sc influences of orographic obstacles on air movement], p. 403–416.

Becker, W.: **Winde und turbulente Luftströmungen in der Ionosphäre,** [Winds and turbul air flow in the ionosphere], p. 417–439.

Trapp, E.: **Ableitung der Magnitudengleichung für die Erdbebenstationen Wien und Graz allgemeine Bemerkungen zur Magnitudenberechnung,** [Derivation of magnitude equat for earthquake stations Vienna and Graz and remarks on magnitude calculation], p. 4 450.

Saxer, L.: **Über Entstehung und Ausbreitung quasiperiodischer Luftdruckschwankung** [The origin and propagation of quasiperiodical pressure fluctuations], p. 451–463.

Archiv für Meteorologie, Geophysik und Bioklimatologie, Serie B, Vienna, Volume 5, Num 3/4, 1954.

Neumann, J.: **On the annual variation of evaporation from lakes in the middle latitudes,** p. 2 306.

Sauberer, F. and Dirmhirn, I.: **Über die Entstehung der extremen Temperaturminima in Doline Gstettner-Alm,** [The origin of extreme temperature minimum in the do Gstettner-Alm], p. 307–326.

Prohaska, F.: **Bemerkungen zum säkularen Gang der Temperatur im Südpolargebiet,** [Rema on the secular temperature cycle in the South Polar region], p. 327–330.

Hader, F.: **Nordostalpine Seehöhenmittel der Niederschlagsmenge (1851–1950),** [Northeast Alpine mean sea levels of the amount of precipitation (1851–1950)], p. 330–343.

Gräfe, K.: **Über Möglichkeiten der Bestimmung, Berechnung und kurzfristigen Vorhersage der Globalstrahlung am Erdboden,** [The possibility of determination, calculation and short range forecasting of global radiation on the ground], p. 344–376.

Buettner, K. J. K.: **Thermal stresses in the modern aircraft,** p. 377–387.

Neuwirth, R. and Hummel, K.: **Wettereinflüsse auf das Lichtstreuvermögen von kolloidalen Lösungen (Polyvinylpyrrolidon),** [Weather influences on the capacity of light dispersion by colloidal solutions (Polyvinylpyrrolidon)], p. 388–402.

Caroli, G. and Pichotka, J.: **Weitere Untersuchungen zur Beziehung zwischen Blutgerinnung und Wetter,** [Further investigations on the relationship between blood coagulation and weather], p. 403–412.

Courvoisier, P. and Wierzejewski, H.: **Das Kugelpyranometer Bellani,** [Bellani spherical pyranometer], p. 413–446.

Raschke, K.: **Die Kompensation des Strahlungsfehlers thermoelektrischer Messfühler,** [The compensation of radiation errors of thermoelectric sensing elements], p. 447–455.

Möller, F.: **Über die Farbe der Sicht und des Taghimmels (Nachtrag),** [The color of visibility and the daylight sky (supplement)], p. 456.

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Rosenkranz, Friedrich: **Phänologische Übersicht über das Jahr 1952,** [Phenological survey of 1952], p. D1–D6.

Hader, Fritz: **Gewitter, Unwetter und Wetterlagenkalender für 1952,** [Thunderstorm, stormy weather and weather type calendar for 1952], p. D7–D17.

Toperczer, Max: **Extremwerte der Lufttemperatur für Wien, Hohe Warte (1873–1947),** [Temperature extremes, Vienna, Hohe Warte (1873–1947)], p. D18–D22.

Roller, Maria: **Die Wahrscheinlichkeit einer Schneedecke in typischen Lagen der Ostalpenländer,** [Probability of a snow cover in typical locations in the east Alpine region], p. D23–D34.

Trapp, E.: **Tages- und Monatsmittelwerte der Deklination nach den Beobachtungen zu Wien-Auhof (Sept. 1951–Mai 1952),** [Daily and monthly means of magnetic declination according to observations in Vienna-Auhof (Sept. 1951–May 1952)], p. D35–D37.

Eder, Hermine: **Örtliche mögliche Sonnenscheindauer in Stunden,** [Local possible sunshine duration in hours], p. D38.

Toperczer, Max: **Der tägliche Gang der erdmagnetischen Elemente von Wien, 1933–1943,** [Diurnal variation of terrestrial magnetic elements in Vienna, 1933–1943], p. D39–D48.

eofisica Pura e Applicata, Milan, Volume 27, 1954.

Das Gupta, Sushil Chandra: **Waves and stresses produced in an elastic medium due to impulsive radial forces and twist on the surface of a spherical cavity,** p. 1–6.

Perri, Emilio: **Sopra un'onda lenta superficiale provocata da esplosione vicina: I,** [On a slow surface wave provoked by a neighbouring explosion], p. 7–29.

Sand, Walter: **Über die Bestimmung von Differenzen der Lotrichtung mit Hilfe des Gradienten *Uzzs*,** [The determination of differences in the vertical by means of the gradient *Uzzs*], p. 30–34.

Matschinski, M.: **Geophysical prospecting and the accuracy of the interpretation of its data,** p. 35–84.

Gougenheim, A.: **Application des transformations homographiques aux projections cartographiques,** [The application of homographic transformations to cartographic (map) projections], p. 85–86.

Tárczy-Hornoch, A.: **Zur Bestimmung der reflektierenden Ebene bei den seismischen Reflexionsmessungen,** [Determination of reflecting plane during seismic reflection measurements], p. 87–97.

Manley, Horace: **A new inductive method for the determination of the temperature variation of susceptibility of rocks,** p. 98–104.

Manley, Horace: **An estimate of the time taken for a dyke to cool through its Curie point,** p. 105–109.

Lundbak, Asger: **About possibilities and limitations in aeromagnetic surveying,** p. 110–115.

Burkhart, K.: **Die Fernregistrieranlage für Deklination und Horizontalintensität am erdmagnetischen Observatorium in Fürstenfeldbruck,** [Remote recording equipment for declination and horizontal intensity at the geomagnetic Observatory Fürstenfeldbruck], p. 116–120.

Gião, Antonio and Raymond, F. H.: **Recherches complémentaires sur les bases du calculate météorologique "temp,"** [Complementary research on the fundamentals of the meteor logical calculator "temp"], p. 121–155.
Gerson, N. C.: **Energy and duration of a sudden ionospheric disturbance,** p. 156–158.
Frolow, Vladimir and Péreau, Aimée: **Définition morphologique de la phase des composant de l'écoulement en Italie,** [Morphological definition of the phase components of runoff Italy], p. 159–166.
Grunow, Johannes: **Über die Bestimmung des Schneeanteils am Niederschlag,** [Determinati of the contribution of snow to precipitation], p. 167–173.
Karapiperis, Leon. N.: **The solar activity and the summer rainfall in the Mediterranea** p. 174–178.
Hesse, W.: **Nebel- und Sichtverhältnisse in Ober- und Mittelitalien,** [Fog and visibili conditions in northern and central Italy], p. 179–189.
Zanon, F. S.: **Il microbarografo Alfani ed i fronti aerologici,** [The Alfani microbarograph a aerological fronts], p. 190–200.
Bossolasco, Mario: **Il regime termico superficiale dei mari Ligure e Tirreno: I,** [The surfa temperature regime of the Ligurian and Tyrrhenian Seas, I], p. 201–215.

Indian Journal of Meteorology and Geophysics, Volume 5, Number 1, January 1954.

Roy, S. C.: **Is the incidence of unusually dusty weather over Delhi in May and June for two consecutive summers of 1952 and 1953 an indication that the Rajasthan Desert advancing towards Delhi?** p. 1–15.
Das, P. K. and Dhar, N. C.: **Meteorological and oceanographic observations on I.N.S. vestigator (March–April 1952),** p. 16–28.
Pramanik, S. K. and Jagannathan, P.: **Climatic changes in India—(II). Temperature,** p. 29–
Ramabhadran, V. K.: **A statistical study of the persistency of rain days during the monso season at Poona,** p. 48–55.
Ganguly, S. R.: **Altitude and azimuth of the sun,** p. 70–76.
Raman, C. R. V.: **Abnormal differences in minimum temperatures at Colaba and Santacr** p. 77–78.
Mazumdar, S.: **Barometric tendency equation for an atmosphere of finite extent,** p. 78–79.
Balasubramaniam, V.: **Weather at Ahmedabad and Poona on occasions of 'below minim conditions at Santacruz,** p. 80–82.

Johns Hopkins University. Laboratory of Climatology, Publications in Climatology, Volu 7, Number 1, 1954.

Mather, John R.: **A summary of evapotranspiration at Seabrook, New Jersey,** p. 7–51.
Gilbert, M. J.: **Evapotranspiration measurements at Waynesville, North Carolina,** p. 52–54
McCloud, D. E. and Dunavin, L. S., Jr.: **Agrohydrologic balance studies at Gainesville, Flor** p. 55–68.
Sanderson, Marie: **Measuring potential evapotranspiration, Toronto, 1947, 1948, 1949,** p. 69–
Sanderson, Maria: **Measuring potential evapotranspiration, Norman Wells, Northwest Te tories, Canada,** 1949, 1950, p. 84–90.
Chapman, L. J. and Linton, G. M.: **Summary report on controlled irrigation at the On Nursery,** p. 94–97.
Guerrini, V. H.: **A year of evapotranspiration in Ireland,** p. 98–111.
Ramage, C. S.: **Evapotranspiration measurements made in Hong Kong, First Report, Octo 1951 to May 1953,** p. 112–124.
Smith, G. W.: **Evapotranspiration in Trinidad, B.W.I.,** p. 125–139.
Garnier, B. J.: **Measuring potential evapotranspiration in Nigeria,** p. 140–176.
Mather, John R.: **A summary of additional evaporation and evapotranspiration measureme** p. 177–199.
Thornthwaite, C. W.: **A re-examination of the concept and measurement of potential eva transpiration,** p. 200–209.

Journal of Meteorology, Volume 11, Number 2, April 1954.

Cressman, George P.: **An approximate method of divergence measurement,** p. 83–90.
Sartor, Doyne: **A laboratory investigation of collision efficiencies, coalescence and electi charging of simulated cloud droplets,** p. 91–103.
Marshall, J. S. and Langleben, M. P.: **A theory of snow-crystal habit and growth,** p. 104–1
Stern, Sidney C. and Schwartzmann, Frederick: **An infrared detector for measurement of back radiation from the sky,** p. 121–129.

Gunn, Ross: **Electric-field regeneration in thunderstorms,** p. 130–138.
Benton, George S.: **The occurrence of critical flow and hydraulic jumps in a multi-layered fluid system,** p. 139–150.
Thuman, William C. and Robinson, Elmer: **Studies of Alaskan ice-fog particles,** p. 151–156.
Dennis, A. S.: **Initiation of showers by snow,** p. 157–162.
Plass, Gilbert N.: **Regions of validity of various absorption-coefficient approximations,** p. 163–165.
Stidd, C. K.: **A note on the application of the hydrostatic equation to atmospheric statistics,** p. 165–166.

[eteorological Magazine, London, Volume 83, Number 984, June 1954.

Lempfert, R. G. K.: **Some reminiscences of the Meteorological Office of the year 1902,** p. 161.
Jones, D. C. E.: **Further investigations of high-level clear-air turbulence,** p. 166.
Jenkinson, A. F.: **Upper winds from nephoscope observations,** p. 174.
Harrower, T. N. S. and Evans, D. C.: **Paraselene observed at London Airport,** p. 184.
Richardson, W. E.: **Low range for a long period,** p. 185.
Lawrence, E. N.: **Eddies unusually defined by snow,** p. 185.
Halo complex, March 2, 1954, p. 186.
The Napier Shaw memorial prize, p. 188.
Review
Veryard, R. G.: **Miller, A. A.—Climatology, p. 189.**

a Météorologie, Paris, 4th Ser., Number 32, October/December 1953.

Bessemoulin, J.: **Quelques aspects du contrôle des prévisions météorologiques et de la nécessité de leur adaptation aux usagers,** [Some aspects of the control of meteorological forecasts and the necessity of their adaptation for the user], p. 219–244.
Gilbert, J.; Lambert, J. and Goyer, G.: **Quelques caractéristiques des perturbations observées à Kerguelen en 1951,** [Some characteristics of perturbations observed at Kerguelen in 1951], p. 245–252.
Cachon, A.: **Le rayonnement cosmique dans l'atmosphère,** [Cosmic radiation in the atmosphere], p. 253–259.
Gaspa, P.: **Les rayons cosmiques, effets physio-pathologiques sur l'homme,** [Physiopathological effects of cosmic rays on man], p. 261–271.
Serra, L.: **Le vent en France et ses possibilités d'utilisation,** [Wind in France and possibilities of its utilisation], p. 273–292.
Grappe, R.: **Comparaison des longues séries de précipitations à Paris et Marseille et leur relation avec l'activité solaire,** [Comparison between long precipitation series in Paris and Marseille and their relation to solar activity], p. 293–300.
Richard, R.: **Phénomène optique remarquable,** [Remarkable optical phenomenon], p. 301–302.
Vassy, E.: **Quelques remarques sur un phénomène de mirage du disque solaire,** [Some remarks on the phenomenon of a mirage of the solar disk], p. 302–303.
Douchy, P.: **Quelques remarques relatives à la validité de la méthode statistique utilisée pour la comparaison des longues séries de précipitations à Paris et à Marseille,** [Some remarks on the validity of the statistical method used for comparison of the long precipitation series in Paris and Marseille], p. 303–304.

Monthly Weather Review, Volume 82, Number 2, February 1954.

Hand, I. F.: **Methods of calculating solar radiation values at Blue Hill Observatory, Milton, Massachusetts,** p. 43–47.
Bibliography of scientific papers by I. F. Hand, p. 48–49.
Lott, George A.: **The world-record 42-minute Holt, Missouri, rainstorm,** p. 50–59.
Krueger, Arthur F.: **The weather and circulation of February 1954,** p. 60–63.
James, Ralph P. and Holzworth, George C.: **Some fluctuations in the jet stream and tropopause associated with cyclonic development and movement, February 18–21, 1954,** p. 64–72.

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Estoque, Mariano A.: **An analysis of rainfall in Manila,** (Pt. 1), p. 5–8.
Bantegui, Celia G.: **Climate of cities in the Philippines, Manila,** p. 14–16.

Number 2, February 1952.

Estoque, Mariano A.: **An analysis of rainfall in Manila, (Pt. 2),** p. 5–8.
Bantegui, Celia G.: **Climate of cities in the Philippines, 2. Cebu,** p. 12–14.

Number 3, March 1952.

Libuit, Modesto O.: **An application of statistics to rain forecasting,** p. 5–8.
Bantegui, Celia G.: **Climate of cities in the Philippines, Zamboanca City,** p. 14.

Number 4, April 1952.

Bantegui, Celia G.: **Climate of cities of the Philippines, Climate of Bacuo City,** p. 10.

Number 5, May 1952.

Estoque, Mariano A.: **Air streams over the tropical Northwestern Pacific during the typhoo season,** p. 5–6.
Bantegui, Celia G.: **Climate of cities in the Philippines, Climate of Dagupan City,** p. 12.

Number 6, June 1952.

Koh, Severino L.: **Thunderstorms in the Philippines,** p. 7.
Koh, Severino L.: **Climate of cities in the Philippines, Climate of Querson City,** p. 12.

Number 7, July 1952.

Castillo, Paulo: **Aurora polaris,** p. 5–8.
Luistro, Farnacio: **Zamboanga Wx Station,** p. 13.
Koh, Severino L.: **Climate of cities of the Philippine, Climate of Tagaytay City,** p. 18.

Number 8, August 1952.

Manalo, Eugenio B.: **Surigao's report on typhoon Emma,** p. 5–6.
Comparative study of Philippine pilot balloon observations, p. 9.
Koh, Severino L.: **Climate of cities of the Philippines, Climate of Naca City,** p. 12.

Number 9, September 1952.

Canlas, Dominador C.: **The influence of weather on shipping,** p. 9–10.
Heaviest rains, p. 10.
Koh, Severino L.: **Climate of cities of the Philippines, Climate of Legaspi City,** p. 12.

Number 10, October 1952.

Castillo, Paulo S., Jr.: **The need for a new Philippine climatology,** p. 5–6.
Koh, Severino L.: **Climate of cities of the Philippines, Climate of Galbayog City,** p. 12.

Number 11, November/December 1952.

Deppermann, C. F.: **Tropical disturbances and microseisms as observed in Baguio City,** p. 9–
Dano, Agapito L.: **Steering principle on typhoon movement,** p. 13.
Koh, Severino L.: **Climate of cities of the Philippines, Climate of Roxas City,** p. 18.

Royal Meteorological Society, Quarterly Journal, Volume 80, Number 344, April 1954.

Bergeron, T.: **Reviews of modern meteorology—12. The problem of tropical hurricanes,** p. 13 164.
Bushby, F. H. and Hinds, Mavis K.: **The computation of forecast charts by application of t Sawyer-Bushby two-parameter model,** p. 165–173.
Langleben, M. P.: **The terminal velocity of snowflakes,** p. 174–181.
Smith, E. J. and Heffernan, K. J.: **Airborne measurements of the concentration of natural a artificial freezing nuclei,** p. 182–197.
Rider, N. E.: **Evaporation from an oat field,** p. 198–211.
Johnson, D. H. and Daniels, S. M.: **Rainfall in relation to the jet stream,** p. 212–217.
Bannon, J. K.: **Note on the structure of the high altitude strong-wind belt in the Middle E in winter,** p. 218–221.
Jennings, E. G. and Monteith, J. L.: **A sensitive recording dew-balance,** p. 222–226.
Hirst, J. M.: **A method for recording the formation and persistence of water deposits on pla shoots,** p. 227–231.
Black, J. N.; Bonython, C. W. and Prescott, J. A.: **Solar radiation and the duration of sunshi** p. 231–235.
Neumann, J.: **A note on the estimation of diurnal amounts of evaporation,** p. 236–237.
Spurr, G.: **A comparison of the Dines and Bibby raingauges,** p. 237–238.
Knighting, E.: **Upper winds over the world,** p. 239–240.

Great Britain, Royal Meteorological Society: **Discussion on stellar scintillation,** p. 241–260.
Great Britain, Royal Meteorological Society: **Discussion on smog,** p. 261–278.

eather, Volume 9, Number 5, May 1954.

Rebman, Edwin J.: **January temperature profile, Victoria B.C.—a west-coast singularity,** p. 131–136.
Arctic weather stations, p. 137–139.
Monteith, J. L.: **Refraction and the spider,** p. 140–141.
Scorer, R. S.: **How to broadcast the weather forecast,** p. 141–143.
Poulter, Robert M.: **Abnormal crass minimum temperatures,** p. 144.
The weather of April 1954, p. 145.
Lawrence, E. N.: **Microclimatology and hydroponics,** p. 147–152.

Letters to the Editors

Harper, R. D. M.: **Hill standing waves and safety heights,** p. 158.
Priestley, Charles F.: **Prebaratic weather charts,** p. 158–159.
Francis, J. R. D.: **The roaring forties,** p. 159.
Richardson, W. E.: **Average temperatures in remote places,** p. 159–160.
Griffin, Roger: **A home-made rainfall recorder,** p. 160.

PART IV. AUTHOR AND SUBJECT INDEXES

In this section will be found reference to the numbers given at the head of each abstract or ent
In Part I each entry begins with 5.6–, and in Part II, in the bibliography on Numerical Forecast
each entry begins with 5F–. This index is divided into three parts:

Index of Authors Index of Subjects Index of Geographical Locations

INDEX OF AUTHORS

Aario, Leo, 5.6–251
Abbot, C. G., 5.6–74
Abdullah, Abdul J., 5.6–218
Aerophysics Research Foundation, Santa Barbara, Calif., 5F–113
Agari, S., 5.6–67
Alexeef, Alexander G., 5F–10
Alvarez Castrillón y Bustelo, Manuel, 5.6–279
American Meteorological Society, 5.6–23, 5F–106
Anderson, L. J., 5.6–283
Angervo, J. M., 5F–3
Antevs, Ernst, 5.6–252
Arnason, G., 5F–81
Arons, A. B., 5.6–190
Atlas, David, 5.6–227, 5.6–274
Aubert, Eugene J., 5F–33

Baden. Landeswetterdienst, 5.6–1
Badgley, Franklin I., 5.6–167
Bain, W. C., 5.6–284
Baldinger, E., 5.6–285
Balk, 5.6–277
Banerjee, D. K., 5.6–286, 5.6–287
Banerjee, S. S., 5.6–286, 5.6–287
Barad, M. L., 5.6–101
Barlow, E. W., 5.6–129
Barrar, Richard B., 5.6–109
Bath, Markus, 5.6–202
Baur, Franz, 5.6–73
Beck-Mannagetta, Peter, 5.6–253
Behrendt, Ernst, 5.6–130
Belgrade. Aerološka Opservatorija, 5.6–45
Belinskiĭ, V. A., 5F–14
Bellamy, J., 5F–50
Berger, P., 5.6–134
Bergsten, Folke, 5.6–193
Berkes, Zoltán, 5.6–272
Berkofsky, Louis, 5F–51
Bernard, Pierre, 5.6–124
Bider, M., 5.6–223
Blehm, Lois D., 5.6–229
Bliumina, L. I., 5.6–2
Blue Hill Observatory, 5F–111
Blüthgen, J., 5.6–13
Bochet, R., 5.6–273
Bolin, Bert, 5F–34, 5F–52, 5F–82
Borisova, E. I., 5.6–2
Brandejs, Stanislav, 5F–120
Brooks, C. E. P., 5.6–74
Burgwald, Glenn, 5.6–63
Bushby, F. H., 5F–35, 5F–36, 5F–44, 5F–55, 5F–76, 5F–83, 5F–84, 5F–107
Butler, S. T., 5.6–142
Byrnes, W. P., 5F–110

Čadež, M., 5.6–159
Caldirola, P., 5.6–137
California. Dept. of Public Works. Div. Water Resources, 5.6–237
Canada. Meteorological Division, 5.6–29, 32, 5.6–68
Caro, D. E., 5.6–138
Caskey, J. E., 5.6–27
Charney, Jule G., 5F–15, 5F–20, 5F–21, 5F–26, 5F–31, 5F–34, 5F–37, 5F–78, 5F–5F–106, 5F–108
Chicago. University. Dept. of Meteorol 5F–42
Christe, Ernest J., 5.6–86
Citron, Anselm, 5.6–139
Clapp, Philip F., 5F–86
Clayton, George D., 5.6–96
Colorado Agricultural Experiment Stat 5.6–229, 5.6–230
Colorado. Univ. Upper Air Laboratory, 50
Contract AF 19(122)-49, 5F–100
Contract AF 19(122)-245, 5.6–55
Contract AF 19(122)-392, 5.6–31
Contract AF 19(122)-446, 5.6–157
Contract AT(45-1)-236, 5.6–167
Contract CWB-8163, 5F–111
Contract CWB-8310, 5F–111
Contract DA 36-039-sc-125, 5.6–89
Contract NONR-158(00), 5F–77
Contract NONR-988(01), 5F–97
Contract Nonr-798(00) (NR-85-001), 5.6–19
Contract N189s-81138, 5F–113
Contract N5ori-07634, 5.6–109
Contract N6onr-27702 (NR-082-021), 5.6–2
Contract N6ori-20, T.O. II, 5F–42

LIST OF PERIODICALS

Note: This list contains the titles of the periodicals which regularly contain material on meteorology or related fields and it comprises only a small percentage of the periodicals from which pertinent articles are abstracted.

In this list the preferred form of title entry is given in bold face type. If the title is distinctive, the name and headquarters of the issuing society or organizations follows the title. If the title is not distinctive (for instance, Bulletin, Journal, Trudy, Mitteilungen), the entry consists of the issuing body followed by the title.

PERIODICALS IN WHICH METEOROLOGICAL ARTICLES REGULARLY APPEAR

Académie des Sciences, Paris, Comptes Rendus.
Akademiia Nauk SSSR, Izvestiia, Ser. Geogr. and **Ser. Geofiz.**, [Moscow].
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★ Indicates those periodicals which are primarily meteorological

TABLE OF CONTENTS

Meteoroloigcal Abstracts and Bibliography, Volume 5, Number 6, June 1954

Foreword
Explanations

PART I. ABSTRACTS OF CURRENT METEOROLOGICAL MATERIAL

Works of Special Interest
General Meteorology
Meteorological Observations and Instruments
- Methods of Observation
- Observational Data
- Instrument Carriers
- Instruments

Synoptic Analysis and Forecasting
Structure and Physics of the Atmosphere
- Structure of the Atmosphere-Ionosphere
- Mechanics and Thermodynamics of the Atmosphere
- General Circulation
- Atmospheric Disturbances

Radiation and Temperature
- Radiation
- Air temperature
- Soil Temperature
- Sea Temperature

Pressure and Wind
- Pressure
- Turbulence
- Wind
- Special Winds
- Wind Effects
- Upper Air Winds and Vertical Motion

Aqueous Vapor and Hydrometeors
- Humidity and Evaporation
- Condensation
- Fog
- Clouds
- Precipitation
- Rain, Hail and Snow
- Hydrometeorology

Climatology and Bioclimatology
- Climatology
- Climate of Particular Places
- Climatic Changes
- Microclimatology
- Climatic Classification
- Bioclimatology
- Environmental Influences
- Air Mass Climatology

Miscellaneous Applications
- Solar Influences
- Visibility
- Optical Phenomena
- Electrical Phenomena
- Acoustical Phenomena

PART II. ANNOTATED BIBLIOGRAPHY ON NUMERICAL FORECASTING

Introduction
Subject Outline
Bibliography on Numerical Forecasting
Supplementary Material

PART III. METEOROLOGICAL ARTICLES APPEARING IN RECENTLY ISSUED PUBLICATIONS

PART IV. AUTHOR AND SUBJECT INDEXES

Index of Authors
Index of Subjects
Index of Geographical Locations

List of Periodicals ... Cov